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Volume XXIII NOVEMBER, 1942 No. 11

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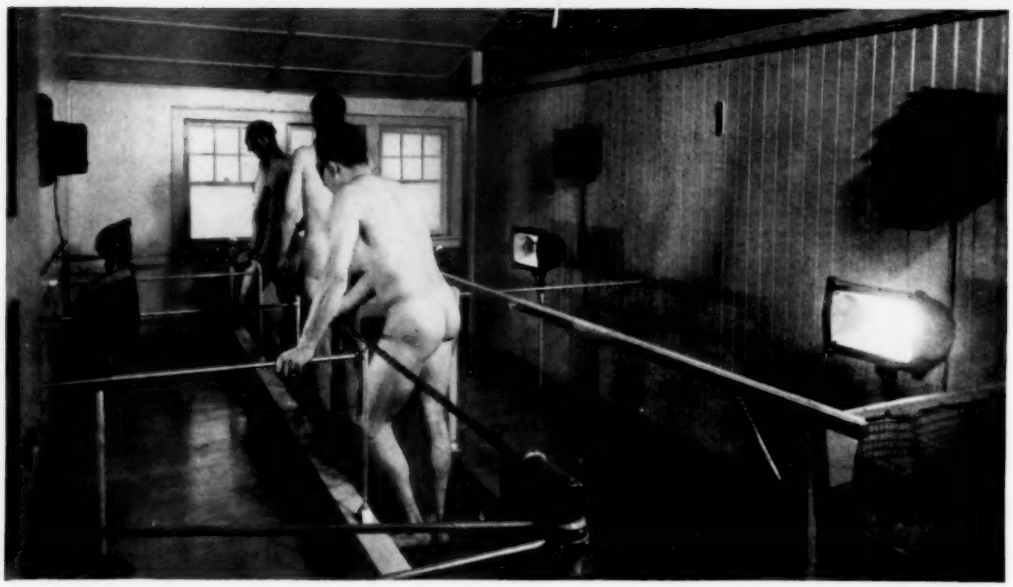

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EDITOR OF THE MONTH

WALTER M. SOLOMON

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POLIOMYELITIS AND PUBLIC HEALTH

DON W. GUDAKUNST, M.D., Dr. P.H.

Medical Director, The National Foundation for Infantile Paralysis, Inc.

NEW YORK, N. Y.

Infantile paralysis, most feared of all diseases that threaten mankind because of its crippling effects on the human body, has in recent years been subjected to study and investigation far more intensive than has ever before been concentrated, to my knowledge, on any single disease. That such concentrated study should have resulted in multiple achievements is not perhaps remarkable. It should be, however, an inspiration to physicians, medical investigators, and people everywhere, because it proves more than ever that health is to a large degree purchasable. Money alone cannot achieve results similar to those that have been secured in infantile paralysis.

The inspiration associated with the National Foundation for Infantile Paralysis, beginning with the President of the United States, the Board of Trustees of the Foundation, the president of the Foundation, and the entire staff, has been absorbed by all of the members of the various scientific committees and by the investigators themselves. Seldom is such devotion seen in any human effort as has been observed in the research inspired and financed by the National Foundation for Infantile Paralysis.

' ' ' Obviously the end is not yet in sight. New problems appear as old problems are solved. What has been learned about the virus of infantile paralysis has led us into an appreciation of new diseases caused by other viruses that select the nervous system as their main habitat. — *Foreword by Morris Fishbein, M.D., for "The Importance of Research." — National Foundation for Infantile Paralysis, Inc.*

The obligations of the National Foundation for Infantile Paralysis naturally fall into two main classes. First, we must see that all possible aid is given to those infantile paralysis victims who are already with us and to the annual group of new patients. The best in medical, nursing, physical therapeutic and hospital care must be readily available to all. This is primarily a responsibility of the county chapters of the foundation. Second, there is an even more important and infinitely more difficult task, that of reducing the annual number of new cases. This is a problem that can be approached only by a national organization. The problems of prevention and reduction call for a nationwide attack of all forces. The task has long been appreciated, but until there was a national foundation no one was able to make much progress, and this has called for patient study and tedious exploration into new fields, in a word — research.

The research program of the national foundation makes a fascinating and almost unique story. No large institute has been established, no marble halls have been erected and no brick and mortar monuments set up. Rather than attempt to draw scientists to one central point, the foundation has gone to the workers. It has sought out in their own hospitals and laboratories the men of skill and special abilities. It then has given them what they needed to carry on their work and to direct their energies into channels related to infantile paralysis.

Even to list the problems that must be solved would be impressive; to describe what is being done would fill volumes of the most dramatic reading. What is the nature of the virus causing poliomyelitis? On what sort of food dose it live? How does it multiply? Does it pick out nerve cells and only certain nerve cells? It has long been known that the virus lives within and thereby destroys certain cells deep within the brain and spinal cord, but how can it possibly escape from there? And how can it find its way into the bodies of new victims? What are the laws that control the selection of new victims? Is it only by chance — only because of lot — only by the rules that govern the flip of a coin or the fall of the dice, that it is

decided who is to be a victim — who is to be paralyzed, or who is to die — or who is to escape this year only to be a victim later? Does what we eat or drink or how we live determine these things? Or can the fly, the mosquito, the tick or other insect be the deciding factor? Can the virus be spread by milk, food or water? During the long months when infantile paralysis is a rarity, where does the invading organism capable of producing such damage lurk? And why does it appear so mysteriously and then just as mysteriously disappear? Can domestic or wild animals or even birds or fish be the carriers?

These are but some of the problems, the answers to any one of which may lead to at least some form of prevention. There must be a never ending search for some drug that can kill the virus once it has entered the body or once its hiding place in nature has been ferreted out. The research problems are greatly magnified by adding to this list the hope of developing some sort of vaccination such as we now have for smallpox, typhoid fever, diphtheria, typhus and the long list of pestilential diseases that once shortened the life of man.

But prevention is not enough. Cure must be sought. As with other disease battles, no defense has ever been quite enough. There must be added improvements in treatment. How can deformities and crippling be prevented even though poliomyelitis infection does develop? Can we place our faith in the theory that resting paralyzed arms and legs is the best form of treatment? Experience has shown that as good as rest has been it is not enough. To understand treatment we must know more about muscles. How and why does a well muscle move an arm or a leg? What happens in infantile paralysis to prevent this motion? It is not enough to say nerves have been diseased. It is not that simple, for study of both human beings and animals dead of poliomyelitis has shown that extensive damage can and does take place in some with little or no paralysis, while in others crippling deformities have developed with only a minimum of damage to nerves.

These are but some of the questions that are being worked on by research workers financed and aided by the National Foundation for Infantile Paralysis.

When viewed in the light of vital statistics, infantile paralysis is not an important disease. There are on the average from 8,000 to 10,000 new cases a year, with usually not over 500 deaths. Yet quite properly a program of study of infantile paralysis has been built up which is surpassed in scope and seriousness by the work done in connection with few, if any, other diseases. Infantile paralysis *is* a serious medical and public health problem, serious out of all proportion to its numerical incidence. The study program is even more important than the disease, for it involves basic pioneering and investigation in fields that have been barely touched by medical research.

The character of viruses, their effect on the body and on its defense mechanisms, their means of spread, their methods of prevention and the role of chemotherapy are still unwritten chapters. There is much to be learned about the structure and function of the neuromuscular mechanism of the body before there can be an understanding of the pathologic changes and the symptoms resulting from invasion of neurotropic viruses.

Public health and medical officials are well equipped to combat the spread of and to treat most of the bacterial diseases, but there is little or nothing to be done about most of the virus diseases. For but few of these have the methods of spread been worked out; for a still smaller number have methods of immunization been developed and for almost none have therapeutic methods of value been devised. Every bit of specific information and

every new technic developed relative to poliomyelitis lead to new gains in the fight against other virus infections.

Ventures into the study of any virus are romantic indeed. The term is used freely, but ordinarily with little understanding. It is not easy to answer the question as to what a virus is. It is assumed that it is a particulate form of matter endowed with at least some of the properties of life of more highly organized structures. It multiplies; it can be "killed"; chemically it is a protein; it has definite physical properties in respect to size; it has fairly fixed reactions with living body cells. Yet it is an obligatory parasite, manifesting its reproductive ability only when attached to or drawing on some other living cell. Separated from this cell it apparently neither reproduces nor manifests other attributes of life. Some viruses have been obtained in crystalline form, apparently remaining indefinitely in that state without demonstrable evidence of functioning metabolic processes, yet capable of producing infection and once more reproducing their kind on contact with appropriate host cells. These are little understood activities. Speculation and hypotheses outstrip knowledge.

Yet such knowledge is of the utmost importance to those who would control a disease. If the poliomyelitis virus can continue to live in a state of suspended animation in nature as it does in the laboratory, then indeed there is a most formidable problem. This virus is not inactivated by drying, extreme cold, ether or glycerine. Nor is it readily acted on by chlorine, wide changes in pH, phenol and other common bactericidal or bacteriostatic agents. In fact, laboratorians resort to the use of such agents in preserving the virus and in separating it from infectious and pathogenic bacteria. Possibly an absence of the highly complicated and delicately constructed enzymes within the structure of the virus not only causes it to be dependent on other more elaborate cells for an ability to reproduce but causes it to be highly resistant to many killing agents. It is possible that it is not easily killed because it is "simple" in structure.

Poliomyelitis is an infectious and communicable disease. Hence, it is logical and reasonable for public health officers to be concerned about it. Today there is not one thing the health officer can do to prevent its spread. During the past several years it has been repeatedly shown that the virus is eliminated from the body through the intestinal tract in the stools. It has been recovered from stools of patients and contacts for periods as long as seven months. It has been recovered from sewage from communicable disease hospitals and from sewage of large cities at points many miles removed from known cases. Flies have been shown to carry the virus in or on their bodies. Theoretically, at least, the virus is as widespread in nature as human fecal contamination.

In the laboratory, infection has been produced in the susceptible animal by inoculation of virus-laden material into the nares, the peripheral nerves, the brain, the blood stream and the peritoneal cavity. Infection can be caused by intradermal and subcutaneous injections, as well as by feeding and inhalation. Apparently any method that allows for introduction of the virus into the body can cause infection.

Both in the experimental animal and in man the virus is recovered from many tissues. It is not only an invader of the anterior horn cells of the spinal cord. It has been found in the blood stream, within the walls of the intestine, in basal ganglions and in lymph nodes. Evidence of pathologic change is not limited to the anterior horn cells but has been demonstrated in almost all nervous tissue.

The study of immunity has brought forth some exceedingly important

relationships. One attack in the experimental animal does not confer absolute immunity. Such immunity as does develop is relative and appears to be associated with cellular rather than strictly humeral phenomena. Second attacks are readily possible even with homologous strains of poliomyelitis virus, provided different portals of entry are utilized. Yet serum from an animal convalescent from poliomyelitis does offer at least a temporary protection in the experimental animal. The age distribution of human poliomyelitis would indicate that there is an acquired immunity that is not dependent on maturation alone.

The prospects for an active immunization program as a means of control are none too bright in the light of present day knowledge. If a frank attack does not offer protection (save in a limited sense), there would seem to be but small chance for immunization by use of an attenuated or killed virus. To date all such attempts both in the laboratory and in a few field trials with children have met with failure.

An apparent misconception has arisen relative to the immunity conferred in man by one frank seizure. Rarely does a physician report a second case in the same person. This can be accounted for on a purely mathematical basis. Using the incidence or attack rate in man of approximately 6 per 100,000 population (8,500 + per year) and assuming that infection occurs only on the basis of chance, it is easy to compute the likelihood that any one of these persons will ever have the disease again. It would be at least two years before even one patient of any annual list had a second attack. The wonder is that such attacks are observed at all. It is not improbable that acquired resistance may depend not on a frank attack but rather on repeated exposures, leading to subclinical infection involving or closing many of the various possible pathways of entrance of the virus to the central nervous system.

The exposure rate in any community during even a mild outbreak must from all evidence be tremendously large. The virus is widespread in nature. It is highly resistant to factors that kill other organisms. But poliomyelitis is not easily diagnosable. There are no definite criteria by which this disease, even in its most severe form, can be distinguished from other neurotropic virus infections. There are no practical laboratory aids in diagnosis of abortive or subclinical infections. There is no method for culture of the virus, as in diphtheria or typhoid. There are no precipitation or agglutination tests, no cutaneous reactions. Examination of the spinal fluid is of only limited value and offers merely circumstantial evidence. The virus cannot be recovered from body tissue or excretions save by use of a monkey, and then only after many weeks of patient waiting.

There are no facts relative to the actual number of persons harboring and spreading infection yet showing no symptoms indicative of poliomyelitis. The number must be very large. In one isolated New York rural community 5 cases of paralysis were reported within two days. No other occurred. The stools of 27 persons who had had intimate contact with one or more of these patients were examined. Poliomyelitis virus was obtained from 20 of these. As an additional important finding it was reported that the results were negative of a small number of persons in the same community who had not had contact with the patients. These studies were made in an area where the "epidemic" lasted but two days and only 5 cases were reported. How far and how wide these 20 known carriers spread the disease is not known. What the picture might be in an urban population with multiple foci of infection and multiple and complicated contacts can only be surmised. The wonder is, not that there are 8,000 to 10,000 new cases a year, but that there are not 100,000.

There may be several answers to this question. The reason for the relatively few cases may lie within either the virus or the host. For all that is known there may be several hundred thousands of cases of poliomyelitis infection each year — with for the most part only a mild gastrointestinal infection and few if any recognizable symptoms. Invasion of the central nervous system may be as uncommon a complication in poliomyelitis as it is in measles, mumps, smallpox, vaccination or other common virus diseases. The complication may result from mutation of the virus from a viscerotropic to a neurotropic form. It may even be dependent on environmental factors of a meteorologic nature. Or it may depend on some set of forces operative entirely within the host.

To date no studies of the human or animal hosts have given any clue as to what these factors may be. Certainly they are not associated with race, sex or geography (except that there is a higher rural than urban rate). The age range of cases is relatively wide. All studies on monkeys, cotton rats and mice point to the fact that vitamin deficiencies do not lower resistance. Clinicians have long remarked on the fact that the paralytic form of the disease tends to occur in the healthiest and best nourished. The obligatory parasitic nature of the virus would support this idea.

Not only is it impossible to foretell in which person paralytic poliomyelitis is likely to develop, but it is equally impossible to tell accurately when any given community is to be visited by an epidemic. Records compiled on county bases over a period of years offer some help, but all they say is that areas long free from the disease in major epidemic proportions are more likely to have an outbreak than those so visited within the past five years. There is nothing certain about this method. It is more accurate in forecasting which areas will not have an outbreak than in estimating which ones will be so visited.

The nature of outbreaks has changed materially in the past quarter of a century. Until 1894 the disease was unrecognized in the United States. That year a few cases occurred in Vermont. In the following years it gradually spread along the Eastern seacoast, culminating in the great outbreak of 1916, when over 27,000 cases were reported, practically all in the East. Now every state in the union reports at least a few cases every year. Every large city annually has its scattering of cases. No month of the year goes by without a few score cases being detected. It seems that the peaks and valleys of the epidemiologic chart are being smoothed out. But the early, tidal wave process is apparently occurring in other American countries. Great epidemics have been reported recently from Central and South America, where five or more years ago the disease was unknown. Already in some of these countries it appears to have become more an endemic than an epidemic disease.

There is no assurance against an upset of the delicate balance between the unknown factors which hold the disease in check and those which allow for its spread. It is not at all impossible that the mass movements of people both within and without the country, the changed living habits and other unevaluated forces incidental to a global war will lead to a national or even a continent-wide pandemic. That this can happen with even the better understood diseases has long been appreciated. That it may occur with any of the lesser understood virus diseases is much more than a possibility. There is need for study. There is need for research leading to some form of protection.

The research and educational programs in poliomyelitis that are being carried on in more than sixty institutions throughout the United States and Canada represent far more than an effort to make progress against a disease

with an annual loss of life measured in hundreds and patients counted by a comparatively few thousands. Of necessity, activities go far beyond such a limited objective. All-important excursions are being made into the unknown in the fields of epidemiology, biology and physiology and therapy.

Physicians are being trained to carry on research in all virus diseases. Public health workers and medical men in their graduate and undergraduate schools are being taught facts about virus diseases in a manner never before possible. As new facts in pathology and physiology are translated into new methods of therapy, more educational channels are opened.

Not the least intriguing phase of this work is the fact that much of it is being carried on under the guidance and with the financial assistance of the National Foundation for Infantile Paralysis. This is not an endowed organization, but rather is one securing its every support from the many millions of this country. A new type of foundation has been developed, based on the idea that the public will freely support a program aimed at doing everything possible to rid the millions of the unnecessary hardships of a devasting, communicable disease — a foundation pledged to carry on research and education as well as to administer medical care to the afflicted.

TREATMENT OF INFANTILE PARALYSIS IN THE ACUTE STAGE * ‡

JOHN A. TOOMEY, M.D.

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CLEVELAND

I. General

In order to evaluate any form of treatment, one must have a knowledge of the natural history of the disease and be absolutely certain of the diagnosis.

1. *The Acute Stage of the Disease.* — If the acute phase of this disease is over when no further muscle paralyses occur, then the acute phase is over quickly — within a period of two or three to approximately seven days. There is usually no extension of paralyses after two to seven days.

The contagious period does not correspond to the acute phase as far as time is concerned. It is arbitrarily placed at twenty-one days, although the virus has been obtained from the stool as long as one hundred and twenty-three days after the onset of the disease. Were this simply a disease from which a person recovered in a certain time, there would be no modification of the conception of "acuteness." However, because of muscular involvements, it may be wise to consider the acute and possibly subacute stages to last as long as any therapeutic procedure can in any way benefit the muscles. The chronic stage would begin when nothing further could be accomplished by muscle training, at which time splinting, casts and operations become necessary.

2. *Objective Criticism.* — The orthopedic surgeon is criticized because of his methods of treatment in the acute stage of this disease. In fairness to him,

* Read at the Twenty-first Annual Session of the American Congress of Physical Therapy, Pittsburgh, Pa., September 10, 1942.

‡ Aided in part by a grant from the Marion R. Spellman and Dr. H. F. Biggar Funds of The Cleveland Foundation.

it should be stated that he often does not see the patient before the quarantine period and the acute phase are over.

In my locality, body casts have not been used by most orthopedic surgeons for years; however, light splints have been applied. These have been taken off during rest and good physical therapy has been employed. If I were to demonstrate results, I could point to the work of one physical therapy physician whose results would compare favorably with those obtained in any clinic.

In being critical, one should not lose a sense of proportion and call a spade a steam shovel. Any treatment, early or late, followed by poor physical therapy will give poor results. Splinting, no treatment or early treatment followed by good physical therapy may yield good results. The question is whether these results are better after one particular method of therapy. It must be remembered, however, that recovery of muscle function depends on the application of good old-fashioned methods of physical therapy.

3. *Natural History.* — The virus of poliomyelitis is commonly prevalent in an infected community and may be recovered from the gastrointestinal tract of practically all persons examined. The disease, however, strikes only a few persons. Thus, this infection may be considered as an accident which occurs during the process of mass exposure.

Many persons will not have any symptoms even though the virus is present in the gastrointestinal tract. Many will have a gastrointestinal upset with some stiffness of the back. Many will also have a stiff neck; others will have these symptoms combined with pain in the muscles, and some will even have a slight paresis. All these types of the infection — asymptomatic, abortive and non-paralytic — should be remembered. They occur in the vast majority of patients, and they recover no matter what type of therapy is employed. Even the mildly paretic respond quickly. Therefore, such patients should be excluded from the statistical study of therapeutic results, or at least tabulated separately. Any therapy or procedure will make a good showing when these patients are grouped together and considered with others who have had more severe involvements.

4. *Diagnosis.* — A. The diagnosis must never be considered proven in the absence of positive spinal fluid findings.

B. No person with paresis or paralysis of the muscles should be considered as having poliomyelitis if the involvement is not segmental in type.

C. The lesion must be characteristic of a lower motor neuron lesion.

D. When there is evidence of an upper motor neuron component the condition should not be diagnosed as infantile paralysis without good and definite reason.

E. When there are distinctive sensory findings (dissociation of temperature, pain sense, etc.) the condition should not be diagnosed as poliomyelitis despite the presence of paralysis.

Patients under "D" and "E" should be considered separately, for, again, unless this is done marked beneficial results can be ascribed to some therapeutic procedure when the patients treated may not even have had poliomyelitis. They may have had a disease from which in due course they would have recovered anyway, as in peripheral neuropathy.

5. *Standard Objective Signs* — There are some signs to which attention should be directed. These signs have been written about, and they have been fully recognized by every physician for over fifty years. What some persons do not realize is that the severity of the signs depends on the severity of the involvement. They may imagine them to be the same in every patient with the disease.

Positive signs are (*a*) meningeal irritation; (*b*) meningeal irritation plus signs of a lower motor neuron lesion, segmental in character; (*c*) all signs under

(*a*) and (*b*) plus signs of reflex tonic contraction of opposing muscle groups, i. e., of the muscle groups opposing those that are paralyzed.

As to negative signs there are no sensory involvements. This disease does not paralyze sensation. Exteroceptive and proprioceptive faculties are present and normal at all times. The patient's discriminative system appreciates pressure, judges accurately the shape of solid objects and gives him a correct knowledge of his position in space, a concept of posture. Manipulation does not furnish the patient with better proprioceptive appreciation. This act merely employs what he already possesses and never loses. The aim of proprioceptive stimulation is to try to time this stimulation with projection of nerve impulse over the remaining efferent nerves and to endeavor to make the two meet. The latter is the faculty impeded or lost.

Under abnormal conditions, normal exteroceptive sensations which ordinarily cause normal responses may be magnified by differences in the threshold value of the receptor organs to give marked reactions when stimulated. Exteroceptive influences are easily ruled out in poliomyelitis by covering the skin with paraffin. When this is done, the pain is still present in the muscle. The sensation of a cold feeling is present, but this is quite different from an appreciation of external cold, which all patients possess.

But few persons whose stools contain virus develop signs; most of them never go beyond the stage of gastrointestinal irritation.

The patient who has the mildest type of disease and has objective signs may develop irritation of the intestine and have a viscerogenetic reflex response. A similar reaction is demonstrated when an irritated and inflamed viscus causes mobilization of a peripheral muscle. Here I feel that there are an irritation of the thoracolumbar outflow and a reflex stiffening of the muscles along the back, and especially of the long muscles attached to the trunk. It is also possible that the virus, as it extends over the thoracolumbar outflow, may reach the somatic nerve, irritate it and cause a peripheral contraction. The extent of the muscle mobilization depends on the amount of viscus involved. If the involvement is slight, the long muscles to the trunk and those of the lower back will be taut; if it is moderate, the muscles about the midthoracic area, and if it is severe, those about the scapula and neck.

This massive reflex response to an irritated viscus is evidenced by positive Kernig and Brudzinski signs (the original method of producing the signs—using the legs), and if it is severe, positive Kernig and Brudzinski signs (the modified way of producing the signs—using the neck) plus a stiff neck and pain along the back and the posterior portion of the neck.

The neck stiffness, whether referred or the result of a direct irritation of the somatic nerve, is not always present and has a tendency to disappear very readily; in fact, it may go away without anything being done about it. It can be overcome quickly with manipulation and a few exposures to infra-red heat. It is quite different in meningitis, in which the somatic ramifications and the covering of the cord are directly irritated. This stiffness cannot be manipulated away.

In the more severely involved patient with infantile paralysis, there are signs of a lower motor neuron lesion. If the disease has extended along the sympathetic chain to the somatic nerves and along these to involve the anterior horn cells completely, there will be lost reflex responses, lost function, atrophy and a reaction of degeneration and typical signs of a lower motor neuron lesion. A more common picture is a modification of the reflexes, pareses of muscles and muscular imbalance.

Not always, but frequently, there may be found a reflex tonic contraction of those muscles that oppose the paretic or paralyzed group. It is never present unless there is some weakness in the opposing muscle. This reflex contraction

does not persist in the average case for any great length of time. In recommending any new therapy, one must remember this and not use the contraction as a measure of recovery without additional specific data. There is a great deal of difference between tonic contraction and contracted muscles, or a contracture in which there has been some deposition of fibrous tissue. I shall not consider the latter in this paper.

Reflex contraction is not always present, but when it is it may be manipulated away easily within a few weeks, although in an occasional patient it may last a few months. In the severely involved person with a possible encephalitic component, it may be difficult to overcome this contraction.

The important things to realize are:

A. The meningeal response obtained by involvement of a portion of the intestine (viscerogenetic reflex or direct irritation) is variable, ranging from simple low back pain and muscle tightness of the thigh-trunk muscles to severe contraction of all trunk and neck muscles.

B. If there is a paretic or paralyzed peripheral muscle, there may be some reflex tonic contraction of the opposing muscle. This is variable and may be absent.

C. Patients with reflex tonic contractions usually recover without much of anything being done.

One must also appreciate that paralysis often comes on without any previous sign of reflex tonic contraction; in fact, it may occur simultaneously in the two muscle groups where reflex tonic contraction has not had time to develop.

A severe, long drawn out contraction of an opposing muscle group may possibly have an effect on the few axis-cylinders that remain to supply the opposing paretic muscle. The effect is not direct, it is indirect, because with the disuse of the muscles of the former group there is atrophy. With atrophy of the muscles, there follows as a matter of course the destruction of axis-cylinders still remaining and the paralysis is made worse.

6. *Types Selected for Treatment.* — All patients should be treated. But when one talks of the results of any one treatment, only those patients with mild but obvious, and those with severe anterior horn cell destruction should be selected to demonstrate its benefits. These patients are the ones who have:

A. The ordinary segmental, somatic involvement of the peripheral body muscles.

B. Intercostal and diaphragmatic muscle paralysis. Although this involvement is also segmental, somatic and peripheral in character, conditions are created which have to be considered separately because of the severity of the symptoms provoked.

C. A bulbar involvement.

D. A hemiplegic condition, encephalitic involvement or peripheral nerve involvement. Few patients are found with these conditions, and the burden of proving that they have poliomyelitis rests on the physician who makes the diagnosis. In any event, these patients should be considered separately.

7. *Muscle Testing.* — I estimate the amount of paresis or paralysis present in the muscles by gaging their ability to contract. This is represented in terms of percentage of muscle strength.

After the edema of the cord has subsided (about two weeks), we test the muscles electrically. We find the ordinary make and break type of galvanic current very informative. Electrodes (McIntosh wall type) applied as nearly as possible over the insertion and head of various muscles of normal persons, give the following results:

Muscle Group	Normal Response With	Muscle Group	Normal Response With
Deltoid	20 volts	Quadriceps	25 volts
Biceps	20 volts	Abductors	25 volts
Triceps	20 volts	Adductors	25 volts
Flexors of forearm	25 volts	Hamstrings	25 volts
Extensors of forearm	25 volts	Peroneals	25 volts
Extensors of fingers	25 volts	Anterior tibial	25 volts
Pectorals	20 volts	Posterior tibial	25 volts
Trapezius	20 volts	Gastrocnemius	25 volts
		Extensor of foot	25 volts

Twenty-five volts is considered normal for most muscles. If between 75 and 100 volts are necessary to contract a muscle or group of muscles, the prognosis is poor and much physical therapy will be necessary to bring about any functional return. If the required number of volts is between 30 and 50, the prognosis is good; if it is below 20, the muscles usually will return rapidly to normal function no matter what the therapy. This method of following the recovery of muscles has been more practical and more objective in our hands than use of the spring balance muscle testing apparatus. Our method lacks the usual subjective qualifications and the personal equations always present when the latter method is used.

Enough has been said to indicate that poliomyelitis is a disease with protean manifestations, one in which these manifestations must be defined and made clear in order to determine the efficiency of any therapy.

8. *Place for Treatment.* — Poliomyelitis patients should be treated in a hospital or in an institution which is prepared to care for this infection. If such facilities are not available, it is sometimes better to keep the patient at home, especially if the mother is an intelligent person and can be taught how to educate a muscle. The amount of recovery is directly proportional to time spent on the patient by the physical therapy technician and the directing physician. The greatest expert need expect nothing but poor results if he only occasionally sees the patient.

It is important to remember that all patients must be kept in bed until such time as weight bearing can be attempted. This may be within a few weeks or may take a year or more. If for some reason the patient cannot or will not stay in bed, splints must be used to support the weaker muscles.

II. General Treatment

A. The patient is placed on a hard mattress.

B. A soft pillow is placed under the small of the back.

C. A box or board is placed at the end of the bed.

D. The legs are pointed straight down.

E. Sand bags are placed to prevent eversion and inversion.

F. A cradle lined with tungsten lights (infra-red 100 watts) is placed over the involved areas (legs, trunk and arms). If 250 to 500 watt bulbs are used, it is best to use them as separate units and not in a cradle. This penetrating heat increases the circulation to the affected parts.

G. A pan of water is placed underneath the cradle to regulate temperature changes.

H. If the skin is too cold, cotton is wrapped around the affected part to keep it warm.

I. The skin is oiled and a barber's electrical vibrator is passed over it three or four times a day to keep the capillaries dilated. This is also accomplished by infra-red heat.

J. If necessary and if the head is floppy, it is held centrally placed on a small rubber ring.

K. Batteries of infra-red lamps are trained on the back of the neck and upper back when necessary.

L. No hypertonic or hypotonic solutions or blood transfusions are given.

M. Drafts are avoided.

N. The position of the patient is changed frequently—he is placed first on the stomach, then on the back. This may not be advisable if there is a bulbar component, and it cannot be done if the patient is in a respirator. It is important not to allow the body to sag; pillows may be put underneath the proper arches to build them up.

O. If possible, the muscles are put through their normal arc of motion two or three times a day.

Sometimes the patient is admitted late and stiffness prevents movement in the normal range. When this occurs, we move the muscles through as much of the arc as possible to prevent further settling of the muscles and manipulate the stiffness away.

1. *Patients With Bulbar Palsy.* — A. These patients are placed supine or prone with the foot of the bed slightly elevated and turned to one side for postural drainage.

B. Aspiration is carried out repeatedly and gently.

C. Speech is not allowed.

D. Some barbiturate may be given.

2. *Care of the Bowels.* — A. Two ounces of 50 per cent magnesium sulfate is given daily for the first two days and a high soapsuds enema three times daily for three days to get rid of the virus and toxic factors present in the intestines.

(Autonomic function is regained within two weeks despite the severity of the disease. One should remember this and not give credit to any therapy for the result.)

B. If gas pockets develop, enemas are given, a rectal tube is inserted and turpentine stupes are applied.

C. Cathartics are not prescribed for patients with bulbar poliomyelitis. Frequent enemas are given.

3. *Care of the Bladder.* — When the bladder is involved, it is catheterized three times daily and then washed out the same number of times with a 1:1,000 dilution of merthiolate. (Bladder function is normally regained within two weeks despite the severity of the disease. One should remember this and not give any therapy credit for the result.)

4. *Diet.* — A. The diet is soft at first and solid in a few days.

B. Gas-producing foods are avoided.

C. Patients with bulbar poliomyelitis are given nothing by mouth and are allowed merely to wet their lips with cracked ice. From 200 to 500 cc. of 5 per cent dextrose is injected by vein for a few days, the amount being increased to 1,000 cc. after three days unless the amount of mucus present is marked.

D. In a spinal type of poliomyelitis, the patient is given 1,000 to 1,500 cc. of fluid daily for the first few days.

5. *Spinal Drainage.* — Spinal drainage is wholly unnecessary. Two lumbar punctures for diagnosis are sufficient.

6. *Drugs.* — Drugs such as methenamine, epinephrine, ephedrine and quinine are worthless, as is autohemic therapy. Morphine and chloral hydrate are contraindicated, especially if the patient has bulbar paralysis. If narcosis is desired, the barbiturates, codeine or the bromides are used. Never use atropine, even when mucus is present; it only aggravates the vagal condition and does not dry up the mucus. The sulfonamide drugs are absolutely contraindicated. They will not cure, and in the experimental animal they aggravate the disease.

7. *Underwater Exercises.* — Underwater exercises may be employed within a few days after the onset of the disease. A shallow, wide tub is more convenient than a pool at this time.

8. *Psychotherapy.* — Patients with poliomyelitis are usually frightened, especially those with bulbar involvement. They have difficulty in coughing the mucus out of the throat. Because they insufflate mucus when breathing and get coughing spells, they try to stop breathing or to breathe shallowly. This forces them to take a deep breath, which thereby immediately causes an attack of coughing. The patient is put in the proper position for postural drainage and the mucus is aspirated, and he should then be reassured. He should be told that the mucus is causing his trouble, that this will be aspirated and that he will then breathe normally. He is to be reassured frequently that this is all that is necessary. Any form of therapy will suffice, so long as drainage is obtained and the patient develops some confidence.

9. *Seventh Nerve Palsy.* — A. Patients with this condition respond quickly (in two to eight weeks) to infra-red therapy. An ordinary 500 watt tungsten bulb is held 18 inches away from the face twice a day for thirty minutes.

B. In between times, the muscle is activated electrically; twenty to thirty contractions a day are given.

C. A woolen cover is worn over the paralyzed side of the face.

10. *Respiratory Involvements.* —A. Any patient who has an involvement of the nerves from the third, fourth or fifth cervical segment (diaphragm) or marked intercostal paralysis should be put in a respirator. He should be taken out of the machine frequently, even if only for one minute in the morning and two minutes in the afternoon; the time out should be increased with each removal. While in the machine, the patient should be taught to breathe synchronously with it and deeply at the end of inspiration.

B. No patient with bulbar poliomyelitis should be put in a respirator. If placed in a respirator, he may inspire the secretion and drown or get bronchopneumonia.

The critics of the respirator build up straw men and state that the respirator does no good. Close examination will reveal that the critics usually deal with conditions for which respirators are contraindicated.

C. No patient with intercostal paralysis alone or with unilateral diaphragmatic paralysis need be put in a respirator.

D. When there is a combined bulbar and intercostal paralysis, the greater of the two evils should be considered. I take a chance and put the patient in a respirator.

III. Specific Therapy

There is no specific therapy of any value.

IV. Treatment of Muscles

(NOTE: This is the same type of therapy employed in the treatment of 76 patients with peripheral neuropathies. The results were equally good. In fact, the criterion of treatment in this condition has been both active and passive therapy and movement as soon as the diagnosis is made.)

One should have some criterion of good results from treatment. Persistent training may continue long after it is necessary and an acrobat is produced. Litheness is sometimes demonstrated after treatment, a litheness that is rarely found in the average person, a litheness which was not present in the same person before he got the disease. Such muscle training does not represent processes of recovery due to any therapy, but rather advanced training of normal muscles. Complete recovery can be claimed if the patient puts his muscles through the same arcs of motion that he did prior to having had the attack of the disease.

1. *Flail-Like Muscles.* — Occasionally, both muscle antagonistic groups will be involved and the muscles of the leg or arm floppy. Here we aim to prevent elongation. The flail-like condition so often talked about is more apparent than real, and good results can be obtained when the hidden stiffness is manipulated. The specter of "flail-like" conditions are ghosts which once created have conditioned our minds and made us fear to do anything for the patient in the acute stage. It should be understood that we have no illusions as to the probable "flail-like" damage which would result should the patient try weight bearing without good orthopedic supervision, but one need not fear such results if the patient is in bed and carefully watched. Nor can it be said that a "flail-like" condition will never occur after any type of treatment. This would contradict objective evidence. When all anterior horn cells have been destroyed, such a condition would naturally follow.

2. *Save Muscle by Conserving Muscle.* — If the motor component of a nerve is severed at its emergence from the cord, the muscles supplied by that nerve will in succession lose their tone, atrophy, become the seat of a low grade infiltration and finally become fixed, immobile and useless.

If, instead of nerve severance, the disease strikes all of the anterior horn cells, the effect is the same.

In most patients, however, although the muscles seem paralyzed objectively, there may be a few viable horn cells and axis-cylinders left. What later will happen depends on what is done for the patient during the acute stage.

If the muscles could be kept in good tone and atrophy prevented, a good reaction would be had if nerve impulses could come through again, if only over the few cells and their processes that have not been totally destroyed.

In brief, it is much more important to save the bulk of the muscle. As demonstrated by us in the human being, the muscle will contract to its maximum capacity even though but a few axis-cylinders of the nerve are left.

3. *Objective.* — Our objective has been to conserve muscle function by conserving muscles. We try to accomplish this by artificially or naturally contracting the paretic or paralyzed muscles, by dilating the capillaries and by maintaining the circulation through physical therapeutic means — active and passive motion, superficial and deep massage, manipulation and the application of deep infra-red therapy. This routine is started as soon as the gastrointestinal tract has been emptied and the temperature has become normal, which may be at once or within a few days after admission to the hospital, no matter how much paralysis is present.

4. *Balanced Motion.* — Man moves as a balanced unit. He can move even with muscle strength but little above 15 per cent of function if the muscles are equally balanced. A person with pernicious anemia or an asthenic disease may have but 20 to 25 per cent of his muscle ability left and be extremely weak, but since his muscles are in balance he can execute complicated synchronous movements well. Thus, balance is more important than strength for coordinated movement.

One needs only two things to accomplish movement: (*a*) a few axis-cylinders along which motor impulses can be sent; (*b*) a muscle in good enough condition so that it will not act as a brake and dissipate the feeble impulse being sent to it.

5. *Early Walking.* — Since the best stimulus to bringing about a normal reflex response is natural resistance, we induce the patient to use his muscles at once and to walk if possible within a week, but to walk correctly, with the aid of attendants, every muscle being properly moved or not at all. If the muscles are too weak to bear weight but can be moved, education may be begun at this early date in bed.

If ulcerations develop, other than those due to direct pressure, I would ques-

tion the diagnosis of poliomyelitis and wonder if a peripheral neuropathy might not be present. The patient with the latter condition also gets paralysis, and it is difficult to distinguish between the two conditions.

6. *Immobilization.* — To my knowledge, the practice of immobilization in the treatment of poliomyelitis in the acute or initial stage was first questioned years ago by the late Henry O. Feiss, an orthopedic surgeon of Cleveland. I am indebted to him for this phase of our treatment, i. e., the abandonment of splints and casts in the early treatment of the disease. The other types of therapy we have evolved through a process of trial and error in the care of over 1,400 patients with acute poliomyelitis.

The disease is in the nerve and not in the muscle, and too rigid immobilization procedures will defeat the very purpose or objective of all treatment, i. e., the conservation of muscle function, either actual or potential. Especially may this be true since muscle substance is lost quickly and atrophy can actually be demonstrated and measured within, seven days after paralysis appears.

Nature does not primarily splint the throat, intercostal and diaphragm muscles because they might become elongated. Why should one splint other muscles?

It does not follow that splinting necessarily rests a muscle and facilitates return of function. Such a procedure does not prevent healthy muscle contracture, since it fails to promote circulation and muscle contraction and encourages the development of atrophy. Power is lost in a splinted muscle, and if splinting is carried too far (i. e., by use of casts), fixation may result.

Over twenty-five years ago, Feiss demonstrated the early treatment of infantile paralysis. He felt that immobilization procedures as recommended by the Harvard Infantile Paralysis Commission, which consisted chiefly in maintaining from the start the greatest rest and fixation that might be obtained by the use of recumbency, rest and splints, was not physiologic in its application. He taught that disuse of muscles in the early stage of infantile paralysis was directly opposed to physiologic indications and that most muscles are in reasonably good condition at the beginning of the disease.

Subsequently, he publicly demonstrated the results of this method of treatment.

I would not agree with Feiss that all patients should be allowed up at once. Doubtless many can be, but they should use all of their muscles properly before walking.

7. *Fixed Splints and Casts Not Used.* — For over twenty years, I have not advised the use of fixed splints or casts. Occasionally, for some reason, a patient's care could not be controlled, or the family or consultant insisted on fixed splints, or it became advisable to have them applied to avoid being sued for malpractice, or we could not control the patient otherwise. Such exceptions have usually been in the case of shoulder muscle involvements and occasionally of back involvements. Our results have been frequently demonstrated in the past fifteen years.

It is incorrect to say that a patient loses his sense of movement in this or that particular muscle, but it is certain that he does lose his ability to project a current of action or motion to muscles. As a consequence, he substitutes and uses other muscles and thereby develops all sorts of imbalanced conditions.

8. *Point of Concentration.* — We concentrate our attention on the paretic or paralyzed muscle. We try to have the patient project motor impulses. Intelligent patients are able to sense the fact that an impulse is reaching the periphery long before there is any actual evidence of motion. We follow the original recommendation of Feiss in directing the patient to concentrate on the paralytic or paretic muscles. Even though he cannot move them objectively he is urged repetitiously to send impulses through the deadened muscles. Synchronous with

the request to move, the operator moves the muscle (passively) through its arc of motion. The strong muscles are not actively or passively contracted; only the weak ones are. Muscles are singled out for individual treatment, depending on their weakness. If one muscle is strong and 50 per cent efficient and the opponent 25 per cent usable, we stimulate and reeducate the opponent only until such time as the strength in the two muscle groups is about equal. These methods are not detailed, since every physical therapeutist is familiar with them.

9. *Routine of Muscle Reeducation.* — One should continue trying for muscle movement for some time: first for the sense of motor impulse projection, then for a trace of movement, then for movement in the position of best muscle response to the least muscular effort, then for movement in an increased arc of motion against gravity by passive aid, then for movement against gravity and finally for movement against increasing and opposing pressure.

Such movements of the patient should be guided by a trained person who under the supervision of the physician directs proper exercise for those muscles that are weaker than their opponents — a person who can attentively follow the after-care. No patient should be allowed to become discouraged. It may sometimes take years to achieve results.

Our methods of treatment have been based on the premise that manipulation and movement do not injure muscles unless they have been weakened by fibrous tissue deposition. We do not have to deal with patients with such deposition in the acute stage of the disease. As far as muscles are concerned, we manipulate, stimulate artificially and passively — and teach concentration and the development of power equally, especially of the weaker muscles, always remembering that time means nothing and that patience means everything. When muscles are weak, we employ the same methods that make a boxer's biceps strong — build them up so that they hold the body in normal position, our objective being to encourage weak or paralyzed muscles.

10. *Manipulation and Position.* — The muscles antagonistic to the paralyzed ones may be found stiffened early in the disease. The usual method of treatment has been to put the paralyzed and opponent muscles in immovable fixed splints in the neutral position. We put them in the neutral position, but leave them free and loosely placed between sand bags. We manipulate the muscles five to six times daily. If the patient is first seen late in the disease and "settling" or stiffness has already appeared, manipulation is started and the muscles moved to the point of pain and slightly beyond, each time a little more, until they are loose. In most patients, this stiffness disappears after a few manipulations, usually by the second or third day, and often without anything being done. In some patients, pain may follow manipulation, but the antagonist muscles are usually free in from three to ten days, and the pain present is controlled by infra-red exposures. Coincident with manipulation, the belly of the stiffened muscle is gently kneaded along the long axis of the muscle fibers, a maneuver which helps loosen the muscle without too much pain. We sometimes fail to relax the muscle fully.

Even before the contracting antagonistic muscles are free and loose, we start stimulating the paralyzed or paretic opponents by the galvanic type of make and break current, getting about twenty to thirty contractions per minute for two to three minutes.

11. *Encephalitic Component (Polioencephalitis).* — If the patient has an encephalitic component, and this is not common, balanced coordination will be difficult, but manipulation and movement may be employed none the less.

12. *Back Muscles.* — Special attention should be given to loosening of the back muscles. The patient is doubled up on himself to a point just a little beyond that at which pain is experienced and then is allowed to rest; the next time manipulation is employed a little beyond the previous painful point, and so on until complete freedom of passive motion is established. If this is done as soon

as the patient becomes ill, the muscles will not "set" and there will be little or no pain on manipulation.

13. *Fatigue.* — One should realize that no exercise should be employed to the point of fatigue. Fatigued experimental animals come down more quickly with the disease. Forceful manipulation is never recommended. The patient, likewise, is not to be excited, worried or allowed to become apprehensive.

14. *Complications of Reeducation.* — If a muscle stays paretic or paralytic, substitution occurs and inefficient movements result. Unless substitution is overcome and the proper muscles activated, the muscles being substituted for may atrophy and the substituted movement become a permanent one. The few anterior horn cells and their axis-cylinders left in an involved area could be compared with a battery which has nearly run down — there may be registration of some current present on the dial, but not enough electricity goes through to turn over the motor. In poliomyelitis, there are a few axis-cylinders left, but time alone can recharge them and they must return to a muscle that has been kept in good condition if any good is to result.

15. *Pain in Poliomyelitis.* — No discussion of poliomyelitis can ignore the question of pain and its treatment. There has been a lot written about pain, but little fundamental information about it has been presented, and nothing about its natural history in the ordinary case.

A. Pain in the abdomen occurs. This is caused by the buckling of a paralyzed segment of the intestine with proximal distention. It is relieved by enemas, by insertion of a Wangensteen tube and by the application of turpentine stupes to the abdomen.

B. The pain due to a distended bladder is relieved by catheterization. This pain is peculiar as to timing in relation to filling. The patient will have pain and accommodate himself to a ceratin quantity of fluid, a certain threshold as it were, and the pain disappears; if the urine keeps accumulating, pain again appears after a time and with accommodation to a new threshold it again disappears. In the male, there may be several such attacks of pain until the force from behind is sufficient to overcome the buckling at the neck of the penis and a flow starts, but the bladder is never emptied. Emptying has to be done artificially. The pain disappears as soon as the distention is relieved.

C. In the preparalytic stage, pain may be experienced in muscles which subsequently become paralyzed. This pain is simply explained. The virus travels along the sympathetic fibers and acts as an irritant when it reaches the somatic nerve. Hyperactivity of reflexes and even at times some muscular twitchings confused with tremor-like contractions may be found. As the virus passes along the peripheral nerves toward the cord, it goes by the posterior sensory neurons; and, as it passes, pain may be produced, a type of pain which precedes segmental somatic paralysis, a direct irritative response. This pain is segmental in distribution and found only in the muscles subsequently paretic or paralyzed. This pain does not last long, being gone in the average instance before somatic paralysis appears or within a few days after this has come on. Often it is absent. This is the type of pain which children have when handled before paralysis appears. It is not initiated in the skin or due to exteroceptive impulses, since it is still present when the skin is covered with paraffin and since there is no evidence of hyperacusis by the usual tests.

D. The fourth type commonly present rises in the unparalyzed opponents of the paralyzed muscles and is a type of pain which appears only on muscle activation. If there is no movement, this pain does not seem to trouble the patient subjectively. So long as no pressure is applied, there is no pain, but when an attempt is made to activate the muscles, the patient may complain bitterly and it may be difficult to move the muscles even by manipulation. This pain is objective. It is unlike the pain arising at the start of the disease. It begins to

be seen simultaneously with or a little after the disease starts and is found not in the affected but in the opposing muscles. It is peripherally activated by pressure. It is not in the skin. It is not due to exteroceptive impulses. It may be of viscerogenetic origin and referred or direct in type, according to whether or not the somatic nerve is irritated directly or reflexly. This type of pain does not last a long time — perhaps two to three weeks or, at the outside, two to three months. It is usually gone in about three weeks. The back, leg and thigh muscles are the ones commonly involved. The neck muscles often escape, but if they are involved, the stiffness and pain disappear in the average case within a few days after the patient is admitted to the hospital without having had any treatment.

The muscle contraction may persist, and if it does there may be a fixation. When the central stimulus is gone, there may still be a local condition which causes a reflex contraction of the muscles, with pain when the muscles are moved.

A similar type of pain, which is common but not always present, is that associated with movement of the head. A stiff neck is common in meningitis and probably is due to definite and direct irritation of sympathetic and peripheral nerves. A stiffness is brought about which is not overcome by forward propulsion of the head on the chest, and attempts at movement are accompanied by severe pain. In poliomyelitis, the head may be held stiffly or retracted, but its position can always be normally approximated by steady forward pressure. The inability to move the head is due to paresis or paralysis of the eleventh nerve, which from its position, arising down deep in the cervical area, could be easily involved. The same mechanism would be found here, i. e., weak or paralyzed muscles and normal tonic contraction of opposing muscles, or perhaps a response occurring after a viscerogenetic primary stimulus.

E. A fifth type of pain, which acts like a vascular spasm, occurs in overzealous patients who activate the weakened muscles too rigorously. This may appear in other muscle groups, but it is usually found in those that have been paralyzed. The patient is put to rest, heat is applied and the muscles are only passively exercised until the pain disappears.

F. A sixth type of pain appears when the muscles have become atrophic, shortened and fixed, usually in some flexion contracted position. It may appear relatively early. It is easily demonstrable when an attempt is made to stretch a muscle through its normal arc.

16. *Sympathetic Involvements.* — I have long held to the view that the autonomic system is involved first in poliomyelitis. This explains the vasomotor spasm, the coldness in the skin, the sweating phenomenon, the occasionally dilated pupil, the motor stasis of the intestine and the paralysis of the bladder.

If the peripheral muscle stimulation is of central origin, a possible explanation would be as follows: The sympathetic nerves are easily involved. In the severely involved patient, they might reflexly (or directly) irritate all somatic nerves so that all muscles supplied by the somatic nerves connected with the thoracolumbar outflow would be more or less in a state of tonic contraction. Where the virus spreads to the horn cells, there would be a loss of connection with the interior. No impulses could be transmitted and the muscles would become apparently lax. But if, as I have shown, even in massive involvement a few axis-cylinders may remain, these few might be slightly irritated. If the virus did not extend up the other nerves, they would still be irritated and the muscles supplied by them tonically contracted. Later, after edema and inflammation subsided, the irritation might become a local reflex phenomenon in the muscle itself.

V. Conclusions

Our results have astonished us. I have had some flail-like extremities develop, but I would expect this to occur with any treatment if all anterior

horn cells had been lost. However, I have had no spinal curvatures develop, nor marked flexion contractions in those patients whom I have been allowed to treat as long as I thought necessary.

We will detail our concrete results in a separate communication. It has been noted by private agencies in Cleveland that the number of hopelessly crippled children has decreased, although the number of cases has increased. Patients have been discharged from the hospital earlier, many walking out within three weeks of admission. The muscles are kept in good condition until the orthopedic specialist can take over the care of the patient.

It can be concluded that the Toomey-Feiss method of treatment, i. e., no mobilization, active and passive treatment and general physical therapy of the weak or paralyzed muscles, and manipulation and massage of the opposing stiffened muscles, i. e., early treatment by properly trained persons, under proper guidance, does not harm the patient and that fixed immobilization is unnecessary in the first stages of the disease.

(For Discussion, See Page 673.)

BASIS FOR TRANSITIONS IN PHYSICAL TREATMENT OF POLIOMYELITIS *

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The reports from Cole, Pohl and Knapp,[1] in Minneapolis, Stimson,[2] in New York, and Bennett,[3] at Georgia Warm Springs, as well as our observations in Pittsburgh, show that certain physical therapy started as soon after diagnosis of poliomyelitis as possible makes patients more comfortable, relaxes muscular spasm, relieves pain and tenderness, permits earlier motion, improves the local and general circulation, and keeps the skin, muscles and joints more pliable and normal in appearance and in tone. If one bears in mind the symptoms, signs and related pathologic changes in the acute stage of the disease, experimental findings on monkeys and autopsy notes on human patients who have died early in the course of the disease, as well as observations from biopsies done early in the disease, the reason for the effect of early treatment seems clear. Hot fomentations dilate the superficial capillary bed, mobilizing circulation which has become sluggish due to stasis associated with muscular spasm and lack of rhythmic muscular contraction and relaxation. Special tests with wisps of cotton and bristles of graduated coarseness, before and after the initial application of fomentations, showed after the moist hot packs a diminution in the keenness of the sense of touch and of pain such as may be noticed after a continuous bath. This suggests that the number of irritating afferent sensations reaching the central nervous system is diminished owing to a sedative effect on nerve endings in the skin which have been abnormally sensitive because of inflammation in the cord, nerve roots and peripheral nerves. If, then, the number of irritating and painful impulses reaching the central nervous system is diminished and if the local and general circulation is improved, the patient and the muscles tend to relax, the relaxation al-

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lowing more normal circulation, metabolism and rhythmic tonic muscular movement. Products of effusion, from the inflammation and irritation in the nervous system and the muscles, tend to be absorbed before the exudate causes further damage either by pressure on neuromuscular units not permanently impaired by activity of the virus or by organization of fibrinous exudate into scar tissue. If scar tissue forms, danger of its crowding and limiting undamaged areas is evident from the biopsies to be described, so that the resultant residual weakness is partly from lack of neuromuscular units destroyed by the virus and partly from impairment of circulation and function in neuromuscular units which did not receive a primary insult from the virus but were secondarily impaired by inflammatory products and organization of scar tissue.

In 1941 during the seasonal outbreak of infantile paralysis, through the cooperation of the pediatric, medical and orthopedic staffs, physical treatment was started as soon as the diagnosis was confirmed when the patients were admitted to quarantine at the Children's Hospital and the Municipal Hospital in Pittsburgh. Experience then and in the past year, while we have been following the same group of patients, led us to believe that changes in symptoms and signs kept pace with changes in the pathologic state. We came to this conclusion after a comparison of reports of gross and microscopic autopsy findings on patients and monkeys who had died from bulbospinal paralysis early in the disease, after muscle biopsy studies made in the first few months of the disease and after study of findings during the chronic stage of poliomyelitis in patients whose muscles and nerve sheaths had been observed during an orthopedic operation or during repair after injury. Correlation of these observations with clinical symptoms gives a basis for guidance in choice and transition of physical treatment for infantile paralysis.

The autopsy on the patient who has died several days after onset of paralysis shows swelling of the cord, its membranes and the nerve roots up to and including the blending of the roots in the intervertebral foramina. Sections and microscopic study of slides show lower motor neuron cell bodies in the anterior horns in various stages of change including swelling, clumping and granulation of Nissl substance in the cyton, chromatoloysis, cytolysis with distortion and disintegration of the cell body and axis-cylinder, cytolysis with surrounding edema, cytolysis with phagocytosis, coagulative necrosis of motor cells with neuronophagia and round cell infiltration. Similar changes are recorded by Hassin[4] in his work on histopathology. These changes, with destruction of the cyton, or essential part of the lower motor neuron, would inevitably be associated with permanent paralysis of the hundred or so muscle fibers related to each average lower motor neuron. If one observes cord sections further, one notices, surrounding the cells just described, other cells which have retained their appearance of normal cytons but may be encircled by distended tissue spaces, areas of perivascular infiltration and inflammatory products. It seems reasonable to suppose that if the patient had lived and absorption of the products of effusion had not taken place, such nerve cells, surrounding the ones which had received permanent primary insult, might have been kept in a state of irritation or permanently damaged by pressure.

Changes along nerve trunks in chronic poliomyelitis may be described from observations on a patient who had all parts of the body severely affected, had been in a respirator for two months, had been treated by rest and rigid splints, and after two years still had pain along the hamstrings, back of the knees and deep in the calves, with almost complete flaccid paralysis of arms, legs and trunk. Exposure of the sciatic nerve showed organization

and matting along the sheath similar to the changes in chronic neuritis. This suggests that the chronic pain could be due to pull of scar tissue.

The changes in affected muscle after two years have been reported clearly by Hipps,[5] who showed photomicrographs of muscle having areas of scar tissue fibrosis with fatty infiltration crowding normal or hypertrophied muscle fibers. Sections of affected muscle taken last year at the D. T. Watson Home from patients in the second to fourth month after onset of the disease showed a similar microscopic picture, except that organization of fibrous tissue had not progressed so far and remaining normal muscle fibers were not so large in diameter. This difference in muscle fibers seems logical, since remaining active fibers, after trying to meet demands over a two year period, would have more hypertrophy than fibers in muscle which had been used carefully and in a limited fashion during the early months of the disease. The fact that disintegration of affected muscle fibers and formation of scar tissue in affected muscle had started so early after onset as shown in some of our sections from patients in the early stages suggests that the earlier after diagnosis treatment is started the better the chance of aiding absorption of products of inflammation in the cord, nerves and muscles, and the greater the possibility of limiting the damage in the neuromuscular units surrounding those which have received primary destruction from the activity of the virus.

When taking our sections from patients in early convalescence from poliomyelitis, all from affected outer hamstrings, we found the following observations of interest: On the patients receiving sedative-decongestive fomentations, who still had tenderness and spasm, when the sheath of the muscle was cut longitudinally the muscle popped out with greater pressure than when a normal muscle bulges through a cut sheath. In addition, instead of the clear serous moisture usually seen when the sheath of a normal muscle is cut, in the sheath of the muscle which had been in spasm and had been tender there was a sticky fibrinous layer. As the sheath was retracted, fibrinous cobwebs were noticed between the surface of the muscle belly and the inside of the sheath. It is known from the stages in healing of any inflamed tissue in the body that unabsorbed fibrinous exudate forms the groundwork in which granulation tissue develops.

One boy, who was in the same stage of convalescence as the others but had not been referred early for treatment, showed a very different picture when the sheath was opened. On previous clinical examination of this patient, when an attempt was made to straighten the leg gently on the thigh, the thigh at right angle to the trunk, the resistance which limited extension 50 per cent (90 degrees) was not of the rebound type felt in muscular spasm but was more rigid and suggestive of adaptive tissue shortening, or contracture. When the sheath was opened, the muscle, which appeared tawny and pale, did not even bulge as a normal muscle would. It remained inert and taut. On retraction of this sheath, cobwebby adhesions were seen. They were of different density from the normal perimysial septa and gave the impression of organized exudate.

A comparison of these observations suggests that early judicious use of fomentations, and physiologic movements as pain and tenderness subside, tends to absorb products of effusion, relieve muscular spasm and limit formation of scar tissue which may ensnare normal neuromuscular units. Thus one may hope to confine residual paralysis to the neuromuscular units which have received a permanent primary insult from activity of the virus. These studies substantiate Sister Kenny's claim that much of the residual damage

in infantile paralysis may be due to muscular spasm, with its attendant pathologic sequence of events.

Thus clinical and pathologic evidence supports the rationale of making a transition from the idea of early rigid rest and splinting to starting physical treatment immediately after diagnosis. I believe that Miss Elizabeth Kenny's most important contribution to the treatment of infantile paralysis is not so much in her technic of applying fomentations or of giving physiologic movements as in arousing the medical profession to the advantage of using such measures early in the acute stage of the disease, thus preventing much of the impaired circulation, fibrosis, loss of muscle sense and restriction of joint action so common in patients who have been treated by early rigid rest and extensive splinting.

For many years an arbitrary division of stages into which the disease poliomyelitis, or infantile paralysis, was divided has been accepted. The acute stage has been defined by some authorities as that during which the patient had fever and appeared acutely ill; others considered that the acute stage lasted during nuchal rigidity, hamstring spasm and spread of paralysis. Still other physicians placed the limit of the acute stage at the time when most of the tenderness had disappeared. In general, the acute stage, as related to the time during which the patient was kept at complete rest, was set at six weeks, although in certain instances pain and tenderness had disappeared by that time, while in others tenderness lasted many months. Symptoms may be interpreted as an index of the pathologic state. After careful observation of patients in quarantine and during subsequent months, the fact becomes obvious that the acute stage varies in intensity and time according to the dose of the virus, the virulence of the virus, the resistance of the patient, the extent of neuromuscular involvement, the degree of general toxemia and the time at which general and local sedative-decongestive measures are started. A patient with moderate involvement of one extremity may be free from fever, pain, tenderness and muscular spasm in a few days, while a patient with involvement of all parts of the body may not show such changes for weeks. A reasonable terminal point for the acute stage could be that time when fever, pain, tenderness and muscular spasm have disappeared. Some parts of the same patient may be free from spasm and tenderness while other parts still show signs of acute neuromuscular irritation. In other words, clinical and pathologic study support the contention that some parts of the cord, with related neuromuscular units, may still have acute manifestations after other areas have become free. Thus we find it logical to make transitions in treatment which may proceed at different paces in different affected parts of the same patient.

I believe that we should be careful, in our enthusiasm for early physical treatment, not to become bound by a ritual of terms and procedures which physicians and laymen think of as a magical formula. We should try to evolve scientific terms which are descriptive and vary procedures according to the indications in the individual patient. In a series of 30 patients in 1941 we had 3 who did not tolerate hot fomentations no matter how varied in temperature or in time of application. These patients had histories of poor vasomotor tone before the onset of infantile paralysis. Hot fomentations led to excessive sweating, loss of weight, rapid pulse and more or less prostration. Even when the fluid intake was increased, cephalic cold used and fomentations limited to one part at a time, the reaction was the same. These patients responded well when a transition was made to alternate hot and cold applications with mild contrast used intermittently, the skin being allowed to become almost dry between applications.

The term fomentations as used and understood by those experienced in physical medicine implies a period after application when the packs gradually cool. We consider this gradual change in temperature desirable for a vasomotor tonic effect. If fomentations were literally kept hot without cooling for twelve hours, day after day, an undesirable passive congestion and loss of vasomotor tone would result. Last summer the mother of one patient quarantined in a country district had been instructed by her physician to apply fomentations and change them every two hours. She read in a newspaper that hot packs brought remarkable recoveries in infantile paralysis. She decided to apply radiant heat to keep the fomentations constantly hot. The boy, whose temperature had become normal, had had one shoulder and arm involved and was improving. Under continuous heating of the body surface he became more acutely ill, and the paralysis spread to involve the trunk and the other arm.

When sedative-decongestive fomentations or other physical measures have reduced muscular spasm, pain and tenderness so that careful assisted movement of the part is possible without pain, proprioceptive movements may be initiated. Sometimes this transition to physiologic movement is delayed unnecessarily long because the person giving the trial movement does not appreciate the importance of gentle, gradual, rhythmic motion, which will give the patient a feeling of confidence in not being hurt and will allow the supervisor to sense the slight resistance to free movement which an experienced person can recognize before actual pain and unnecessary reflex spasm stop the movement and make the patient fearful of repetition. Memory of pain will inhibit rhythmic movement as well as actual pain, which limits synchronous movement by muscular spasm. Proprioceptive training and later reciprocal action, when active use of a muscle causes no pain or spasm, may be advanced more steadily if the supervisor of the treatment has a thorough knowledge of neuromuscular anatomy and physiology, and a delicate sense of touch and rhythm.

Clinical and biopsy studies lead me to believe that if muscular spasm is not relieved early after onset, a gradual organization of inflamed tissue takes place, so that the muscle which is shortened by spasm or position gradually has adaptive tissue shortening and finally no longer gives a rebound on slight, gentle stretch but has the firm, unyielding tautness of a true contracture.

When early physical treatment is used without formal splinting, the care with which the affected parts are alined at the time when fomentations are changed will help to prevent distortion and may be, in effect, splinting. When the time has come for weight bearing by affected legs, those which have not been formally splinted but which have been protected from a tendency to deformity have a surprising ability to perform, even with absence of power in certain muscles, if early physical treatment has been used. Many of the tendencies to distortion in foot, knee, hip or trunk which appear after weight bearing may be controlled by proper balancing of the weight distribution to the feet by adjustment of shoes or the addition of a simple shoehorn support.

When the patient is free from pain, tenderness and muscular spasm and the recovery of muscular function has reached a favorable point, a transition in treatment includes standing, preliminary to walking, as part of the program. Momentary standing to improve balance and muscle sense may be repeated several times a day as indicated in the individual case. One should have in mind not only recovery of muscular and joint function but also correct posture and protective body mechanics. The tendency to deformity in

infantile paralysis develops not only from lack of balance in muscular power but also from static and mechanical strain.

Since we are making a transition from extensive rigid splinting to minimum support to allow freer circulation and more normal function in affected parts, we should not go to the other extreme and feel bound not to use any support at all when a simple balancing adjustment may eliminate development of deformity as the patient assumes a less restricted stage in treatment.

If recovery has been complete so far as muscular strength, balance of power, range of movement and useful function are concerned, we should not release the patient from supervision, because in most instances the affected part remains somewhat smaller than the unaffected or average normal, is cooler than normal and tires more easily. If the patient is permitted unrestricted activity, the affected part tends to become weaker and smaller while the unaffected side overdevelops. Probably most of the patients who seemed to make a normal recovery in strength actually had permanently damaged neuromuscular units and the remaining normal ones had hypertrophied under muscular reeducation. This supposition has been given support by Inman,[6] whose studies at the University of California Medical School showed by action current graphs that affected muscles which may have built up normal power have groups of fibers giving decreased tension but a supernormal action current potential, with a rise more abrupt than normal, indicating the need of an increased activity of motor units to develop tension of the necessary strength. Although such muscles have regained normal power, the lack of a normal number of available active neuromuscular units, which guard against serious fatigue by working in teams, keeps them from having the same graduated control and reserve. Ordinary activity then calls on a higher percentage of the total number of units to overact in order to accomplish the work usually done in shifts at moderate tension by units in an unaffected muscle under average activity.

The analysis of each new case of poliomyelitis may be approached with assurance based on actual experience in outlining treatment, including each advance that is made by interested investigators. Our interpretation of symptoms and of the effects of treatment will be modified from year to year as more clinical and experimental studies add clearness to the understanding of problems in the treatment of infantile paralysis.

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(For Discussion, See Page 673)

THE KENNY TREATMENT FOR INFANTILE PARALYSIS *

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At the University of Minnesota we have now completed, with the aid of grants from the National Foundation for Infantile Paralysis, more than two years of observation of the Kenny method of treatment for infantile paralysis. We not only are just as enthusiastic over the method as we were at the publication of the first report, in June 1941,[1] but are more impressed than ever with the clinical results obtained. In March 1942 a teaching program was launched in order to disseminate reliable information about the method as widely as possible in as short a time as feasible. Up to the present time (Sept. 1, 1942) 148 nurses have been trained in the technic of application of the hot foments and 53 nurses and physical therapy technicians in the entire technic, including foments and reeducation, and 108 physicians from all sections of the United States and Canada have attended courses explaining the method and its rationale. We have endeavored to have at least a physician, a physical therapy technician and a nurse from each institution, so that they can work as a team on returning to their own locality.

During the progress of these courses it has become evident that a great deal of misinformation has been broadcast concerning this method and its foundation on physiology and pathology. In fact, it usually takes about two days of each six day physicians' course to clear up the misconceptions so that we can proceed to the consideration of the method itself.

In this paper I should like to present some arguments developed in collaboration with Dr. Herman Kabat, of the Department of Physiology, and based on previous physiologic and pathologic publications which tend to support the fundamentals of the method. First, there is no disagreement with pathologic findings. We all agree that when a sufficient number of anterior horn cells are destroyed, paralysis results which is permanent and irreparable and cannot be treated successfully by any method known at present. Neither Sister Kenny herself nor any of us who have observed her work in Minneapolis have ever claimed that 100 per cent cures were obtained by the method. I should like to emphasize this statement. There is no disagreement with pathology. There is, however, considerable disagreement with the accepted ideas of the effects of pathologic change on the symptoms of the disease.

The treatment is based on radical changes in physiologic interpretations of the observed symptoms of infantile paralysis. These interpretations are amenable to physiologic investigation, which should prove their soundness or fallacy. Some of this experimental investigation has already been started. The original observations were made by Miss Kenny without distortion by previous knowledge of pathology or of existing interpretations of symptoms in the light of what was then known about pathologic physiology. As a matter of fact, we still know little about the fundamental pathologic physiology of poliomyelitis. Most of what we thought we knew was only conjecture or theory which resulted from logical reasoning based on facts which we now consider to be fundamentally erroneous. In large measure the changes in interpretation constitute direct reversals of the relation of cause and effect.

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I shall discuss individually the three basic ideas which differentiate the Kenny conception from the conventional conception of the symptomatology of infantile paralysis. In addition to paralysis, which is common to both conceptions, these are, in Miss Kenny's own terms,[2] "muscle spasm," "mental alienation" and "incoordination."

Muscle Spasm

The paralysis from poliomyelitis has generally been considered to be flaccid owing to damage or destruction of motor nerve cells of the anterior horns of the spinal cord. Deformities were thought to be due to the muscular imbalance resulting from strong muscles pulling against weaker ones. Thus in the conventional conception the primary cause of muscle imbalance was considered to be loss of muscle power. Muscle shortening, limitation of range of passive motion, contractures and other deformities were thought to be secondary and totally preventable by proper splinting and early orthopedic care.

This has now been shown to be untrue. Steindler[3] reported that in approximately 25 per cent of his carefully splinted patients contractures of some kind developed. In addition, careful analysis of the patient reveals that frequently the most severe contractures occur in muscles which have no power of voluntary contraction and are therefore rated as "zero." Also, careful examination of the patient in the first few days of the disease will reveal that some muscles are already shortened and painful and cannot be restored to normal length even by the application of considerable force. This condition does not at all correspond to the condition of true flaccidity following section of a peripheral nerve, in which the part can be placed passively in any desired position with great ease in spite of marked inequality in muscle power.

These observations support the contention of Miss Kenny that one of the basic symptoms of infantile paralysis is the presence of muscle spasm — an involuntary and uncontrollable shortening of muscle fibers. This spasm is not to be confused with the spasticity of an upper motor neuron lesion which will relax under steady tension.

Here certainly is a complete reversal of the idea of cause and effect. Instead of the idea that a more affected muscle allows deformity to occur by giving way to the pull of a relatively unaffected muscle, it is now considered that a more affected muscle causes deformity by exerting a positive and often unrelenting pull against a muscle which may or may not be affected by the disease. In other words, the deforming force is active instead of passive and therefore requires relaxation rather than support. This relaxation seems at the present time to be best accomplished by the special kind of very hot foments that have been so often described.

Scientific evidence indicating the presence of spasm in the muscles in infantile paralysis has been presented in electromyographic studies published by Schwartz and Bouman.[4]

The question may well be asked, "How can this be when the most prominent pathologic changes are in the motor cells of the spinal cord?"

Consider for a moment some of the possible mechanisms for the production of the spasm. First, as to local causes:

1. Inflammatory or toxic changes might be present in the muscle itself. To the best of my knowledge there have been no extensive studies of pathologic changes within the muscle itself during the acute stage of the disease. Thus there is no proof for or against such a possible mechanism.

2. Circulatory changes resulting in localized anoxia might be the cause of spasm. That circulatory changes do occur in poliomyelitic extremities has

long been recognized because of the temperature and color changes and evanescent swellings frequently seen. Lesions of the sympathetics such as have been found regularly by certain investigators in infantile paralysis might account for these circulatory changes. It is well known that muscle pain fibers come entirely from blood vessels,[5] so that local anoxia might explain the muscle tenderness as well as the spasm. Local anoxia if persistent might result in the development of contractures, of which the Volkmann contracture is an example. High temperature hot packs with quick cooling, such as those employed in the Kenny technic, have been shown to increase the flow of blood through the muscles more than other types of heat.[6]

However, it is not necessary to assume that the local condition is due to local causes. Changes in the central nervous system may also account for these changes in the muscle:

1. There may be so-called irritative cord lesions to account for spasm. This I consider rather unlikely as a major factor, since both spasm and shortening may be present months or even years after the acute attack.

2. It is well known that denervated muscle is hypersensitive to acetylcholine. In infantile paralysis there is an opportunity for an abundant source of acetylcholine through the uninvolved motor pathways, the sensory nerves and the autonomic endings. Here is an excellent mechanism whereby local spasm could be caused by pathologic change in the cord. Kabat and I have started experiments to attempt evaluation of the path this mechanism may play in the picture of the disease. The increased circulation to the muscle obtained by the packs might wash out the acetylcholine and thus relieve the spasm.

Kabat has shown that spinal cord anoxia in animals produces muscle spasm with pain on pressure or stretching with a distribution similar to that seen in infantile paralysis. The intermediate neurons in the anterior horn of the spinal cord are the cells most affected. The physiologic mechanism by which spasm is produced in infantile paralysis should be determinable by physiologic experiments and observations in clinical cases. It is our hope that such information will simplify the treatment of spasm.

3. It is obvious that the spasm frequently changes rather rapidly into contracture, which in time may become irreversible because of fibrous tissue replacement. Myostatic contracture due to immobilization or disuse and contracture due to fatigue, ischemia, etc. may all play a part. These changes are bound to result in disability due to limitation of motion or due to interference with the available power of opposing muscles.

In addition to these purely mechanical disabilities, there is evidence to indicate that prolonged muscle spasm may cause irreversible changes in the muscle itself which might increase the total paralysis in the patient. Dolgin and Lehman[7] in 1929, Grant[8] in 1938, Barcroft and Millen[9] in 1939 and others showed that strong contraction of muscles diminishes or completely stops the flow of blood through the muscle. In other words, strong static contraction is an anaerobic phenomenon. The actual tension of the contracting skeletal muscle is sufficient to stop the flow of blood through it, just as in heart muscle, where, it has long been known, there is no flow of blood through the muscle during systole. It is during the relaxation phase following contraction that hyperemia is produced in the muscle. In infantile paralysis there is apparently a condition in which contraction or spasm may be continuous and unrelaxed, not for seconds or minutes, but for days, weeks, months or even years.

This evidence strongly indicates the probability that fibrosis and contractures may be due to anoxia caused by the spasm. It also seems reason-

able that permanent pathologic changes may thus be produced by the spasm itself, even without extensive loss of motor nerve cells.

In fact, some of the late pathologic changes shown by Hipps[10] might easily be explained by fibrosis following anemia. Of course I do not know and neither does he whether or not the muscles he examined were the ones in spasm (probably many were not). Yet the type of change he designates as type 2, or "fibrous muscle replacement change," and as type 3, or "irregular atrophic and degenerative change," might be examples of this process. It seems to me that his type 1, "homogeneous atrophic and degenerative change," might best be considered a result of "alienation" with atrophy of disuse.

Consideration of all these factors concerning the production, presence and probable effects of muscle spasm lends weight to the argument that muscle spasm should be treated as soon as the diagnosis has been made and should be relieved as soon as possible. It also indicates that splinting, which favors the production and continuance of spasm, should be avoided.

Mental Alienation

The second distinguishing factor in the Kenny idea is the conception of "mental alienation," a term which has brought forth considerable criticism and much debate. It is probably fundamentally a physiologic block in conduction as contrasted with an anatomic block caused by destruction of anterior horn cells. The conditions described by this term undoubtedly include the temporary paralyses produced by nonlethal damage to the nerve cells which recover spontaneously after the subsidence of the infection. However, it includes much more than this, for observation of patients who have been treated only for spasm or who have been treated by conventional methods for some months before the Kenny treatment was started shows that considerable rapid improvement is obtained when the methods of restoring mental awareness and muscle function are commenced. Miss Kenny's own explanation, which is largely psychologic in nature, probably does not cover the entire phenomenon, since interference with conduction at synapses or residual loss of function after partial damage to motor cells has been repaired may well enter the picture. Kabat has suggested the term of "reversible paralysis" instead of "mental alienation."

However, while occasionally paralysis is apparently the first symptom of the disease, it must be admitted that in the great majority of cases the paralysis develops several hours or days after the onset of muscle pain and soreness indicating the presence of spasm. Thus the time element is usually favorable to the psychologic explanation.

The mere fact that reflexes are absent or diminished does not prove that the pathways have been anatomically disturbed even temporarily.

Sherrington's original researches from which he developed the law of reciprocal innervation showed that a pull or stretch of the hamstring muscles caused a disappearance of the patellar reflex. Spasm of the hamstrings of greater or lesser degree is almost always present in infantile paralysis. Edmund Jacobson and Anton Carlson showed that the patellar reflex disappeared during relaxation of trained persons and reappeared immediately on resumption of normal mental activity.

An instance of physiologic block of nerve conduction was published by Bülbring and Burn[11] in 1939; these authors showed that under perfusion conditions impulses applied to the motor roots failed to be transmitted along the sciatic nerve to the gastrocnemius muscle of the dog when the vascular tone became low. This failure of transmission was not due to fatigue, and the failure was not at the nerve ending. Transmission could be restored by

epinephrine hydrochloride and by other constrictor substances but not by increasing the perfusion pressure. Transmission was restored within twenty seconds after stimulation of the sympathetic nerves.

That apparent paralysis which is not due to anatomic disruption of nerve pathways can occur is well known by every orthopedic surgeon who has watched power return to an apparently paralyzed anterior tibial muscle after an operation to lengthen a contracted achilles tendon. Every one agrees that permanent paralysis follows destruction of anterior horn cells; so it is obvious that this apparent paralysis could not be due to destruction of nerve cells.

The conception of "mental alienation" is a valuable one if for no other reason than to point out a possible mechanism for effective treatment and to offer hope for the unfortunate victim.

Incoordination

The third distinguishing idea, incoordination, is easy to describe but rather hard to explain. It merely means that because of disturbances in the normal motor patterns as a result of paralysis, alienation or spasm, new motor patterns are developed which must be restored to normal before normal action can occur. These may show up in the form of substitution which has long been recognized and often encouraged, or in spilling over of impulse to other nonrelated muscles or even to the opponents of the desired action.

Also, the normal rhythm of action within the muscle itself may be disturbed, so that contraction may occur, for instance only at the origin of the muscle, and the efficiency of the muscle may be greatly diminished.

Evidence for the reality of this idea is produced by the numerous patients who have been treated by the Kenny method after months or years of treatment by conventional methods. Many of these patients have been able to walk without support or have been able to use parts which previously were useless, although in most instances muscle tests would show no change in power rating or at most only a slight increase. The increase in useful function is due not to increase in power but to increase in coordination and decrease in limitation of motion from muscle shortening so that the efficiency of the muscle is greater.

It is instructive to watch patients who have received this training from the beginning of the disease as they use parts rhythmically and successfully even though the muscle power may be slight.

Summary

This paper is an attempt to present some arguments in support of the soundness of the physiologic basis of the Kenny treatment for infantile paralysis and to suggest some directions in which further investigations might proceed. No attempt has been made to describe the method in detail, since this has been done elsewhere.[2, 10]

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Discussion of Papers by Drs. John A. Toomey, Jessie Wright and Miland E. Knapp

Dr. Robert L. Bennett (Warm Springs, Ga.): Those of us here who have had the privilege of treating acute poliomyelitis by methods consistent with well-founded principles of physical therapy have received added incentive and inspiration from these three presentations.

Most of us now can see, as I was forced to see and now can see for myself that hyper-tonicity, hyper-irritability — call it spasm if you will — of muscle is an all-important manifestation of acute poliomyelitis. Most of us know, because we have seen the serious early and late effects of untreated and unreleased muscle spasm — effects not only to the contracted muscle, but to its antagonist as well. However, to say with absolute certainty that the one or the other is the involved muscle requires a definition of terms and more proven basic knowledge than I, at least, have at the present time.

Our research workers — our physiologists and pathologists — will eventually give us the basis for these clinical manifestations. Dr. Wright's description of the appearance of the contracted muscle fibers during the early and late stages and Dr. Toomey's discussion of the probable route of virus invasion of the nervous system are extremely interesting and valuable. When all these basic factors are thoroughly understood, intelligent treatment follows as a natural sequence. Scientific medicine should always take this orderly course. Dr. Wright and Dr. Toomey wisely point out that we must be careful not to become bound by a ritual of terms and procedures which physicians and laymen think of as a magic formula and to accept without complete substantiation a universal therapy. We can never hope to treat paralytic poliomyelitis with absolute assurance that nothing more can be done until we know all the details of the underlying pathologic change and deranged physiology.

No one of us working alone can expect to develop the one and only — the flawless treatment. We must profit from the observations of trusted investigators and evaluate these findings in the light of our own experiences. Consider the evolution of the method brought to us by Miss Elizabeth Kenny: How much more logical and scientific is her method of today than it was just five years ago as evidenced by her book published in 1937. The brilliant success of her method of treatment in Minneapolis today must in some part be credited to the able support of the faculty of the University of Minnesota — to the patient intelligent guidance of such men as Miland Knapp. To Miss Kenny for her keen perception and devotion to the cause of correct treatment of poliomyelitis, Physical Therapy owes a debt that only be repaid by an equally keen and devoted research designed to support, or if necessary, to intelligently alter that which she and other serious investigators have given us.

The spotlight is focused on Physical Therapy in the treatment of acute and convalescent poliomyelitis. This light is reflected to touch almost every phase and application of Physical Therapy.

To disagree on certain details of technic is a healthy attitude and a spur to continued research, but our therapy must be based on sound proven physiologic and pathologic facts as well as brilliant end-results before we can say this is the only treatment — all others are wrong.

Dr. B. S. Troedsson (New York, N. Y.): We have listened to three interesting papers. Dr. Toomey described the classical signs and symptoms necessary for the diagnosis of anterior poliomyelitis. He showed the difficulty of making the diagnosis and called our attention to the various types of poliomyelitis. He stressed the importance of the use of early physical therapy which he starts as soon as the fever is over, if I understand him correctly, and he uses all types of physical therapy. I was glad to hear that.

It would be interesting to see the details given by Dr. Toomey when he publishes them. He starts his treatment, as I said, after the fever is gone, and he uses different types of physical therapy. Since the Kenny treatment, on the other hand, is started during the acute stage while the patient still has fever, and adheres to very rigid routine, it will be of great value to us to compare the figures, and I shall await Dr. Toomey's publication of cases with interest. If his figures agree with those of Sister Kenny, I am sure there will be many who will say, "Good! There are other people besides Sister Kenny who know how to treat poliomyelitis!" If they

do not agree, there are many points of difference that can still be argued.

Dr. Wright pointed out the pathologic picture of anterior poliomyelitis. The defense mechanism of the body is inflammation. No matter where it occurs in the body, the sequence of events is practically the same. It is either inflammation followed by regression or inflammation followed by tissue death and repair. When we have tissues, such as nerves and muscles, which have little or no capacity for regeneration it becomes extremely important to keep tissue death at a minimum. In this connection, I think we ought to stress what happens, as Dr. Wright did.

There are three zones. There is one zone in which the nerve cells die or are dead. You might call it the death zone. Then there is the twilight zone, in which the nerve cells may die if our therapeutic procedures are not correct or if there is extension of disease, or we may preserve the cells in the twilight zone by proper therapeutic measure. Then we have a normal zone outside of the twilight zone.

Now, in the absence of specific treatment for poliomyelitis, it seems that we should try with all the means at our disposal to preserve the twilight zone and cause the minimizing of the death in the death zone at the same time. In this aspect it seems to me that we have neglected physical therapeutic procedures. All our attention is concentrated on the peripheral manifestations and what is going on in the cord is lost sight of to a great extent, as far as physical therapy is concerned. This is another field in which we want to try the use of some physical therapy measure, either in the nature of heat or cold.

Dr. Wright called attention to the amount of scar tissue or fibrous tissue accompanying the peripheral manifestations of poliomyelitis. I think this gives us a rational basis for Sister Kenny's treatment, or for the use of physical therapeutic measures. Scar tissue is promoted by circulatory stasis. Scar tissue interferes with function, as we all know, and it may cause further death of tissues by its "choking action," the power of contracting after it has formed.

In an inflammatory reaction there is, therefore, a period at which active measures should be taken to increase the circulation and decrease the action of the scar tissue. Physical therapeutic measures and return to activity have, in my opinion, more to offer than any amount of prolonged bed rest or medical treatment.

It is my opinion that we have to revise our ideas on the value of prolonged bed rest in many diseases, just as Sister Kenny has made us do in poliomyelitis. For instance, I can see no reason why following an attack of, for instance, acute nephritis we should not take measures immediately to counteract the growth in actual scar tissue in the kidney. That scar tissue undoubtedly by its contractile power further damages essential kidney tissue. However, to advocate and try such measures demands boldness. Sister Kenny had it and she is to be congratulated on bringing her treatment to our attention.

In connection with Dr. Wright's paper, I would like to know: If she has obtained any microscopic pictures of muscles in spasm during the acute stage of poliomyelitis. I think if there is inflammation in the muscles, we may have to revise our opinion about poliomyelitis in that it affects not only the cord but also the muscles.

Dr. Knapp indicated that such studies did have to be made. In our daily practice we all see occasional so-called localized myositis in the muscles. We have no trouble treating them and curing them. In most cases they are precipitated by chilling or cold. However, the pathologic changes and the exact mechanism of that condition are unknown as far as I know. I haven't been able to find any satisfactory explanation for it. Now, it is possible that there is inflammation during the acute stage in the muscles. It will be interesting to know.

Dr. Knapp has explained two terms used by Sister Kenny. Incoordination has been observed by most of us and is not difficult to understand. Mental alienation is no new process. We may consider "loss of memory" or such a thing as "compulsion neurosis" also mental alienation. Those terms are known to all of us. Nevertheless, I think Sister Kenny is to be commended for her concept of the disease and Dr. Knapp is to be commended for having the courage to give her the opportunity of trying it out.

Dr. Richard Kovács (New York, N. Y.): I came back from Minneapolis after taking there at the University of Minnesota the Kenny course for physicians. Anybody who has seen the results in the large number of cases critically observed there, both adults and children recovering without deformities, spinal curvatures, the patients who walk without braces, although they have a flail limb, the generally happy countenance of those under active treatment, is greatly impressed by that method. There can be no doubt that if these new principles of early treatment will be generally employed, there will not occur so many of the emotional and physical wrecks that we see even now, in spite of much of the expensive orthodox treatment.

While the Kenny method has thus opened up a new vista in the treatment of infantile paralysis, this does not mean that we have to accept everything Sister Kenny says. We do not even have to use the somewhat confusing terminology. Dr. Knapp has ably reviewed some of these new problems and the newly established physiologic facts bearing on them. Miss Kenny is a difficult person to deal with: having had to fight so much to establish the method, she has become quite inflexible in her views and does not brook any interference or difference of opinion. It now requires the concentrated work of physiologists, orthopedists and physical therapists to further develop these principles and their practical application. One

of the many interesting problems is how to overcome the rigid quarantine regulations in many localities which seriously conflict with the early treatment by appropriate physical therapy.

Physical therapists are duly grateful to Miss Kenny for the opportunities she opened up for a greatly extended field of work.

Dr. K. G. Hansson (New York, N. Y.): Those of us who have been interested in poliomyelitis for the last few years refuse to get too excited or confused by all that happened in the last two years, since Sister Kenny came here. We have seen the development of various treatments come and go. In the 1920's we had that overexcitement caused by underwater exercises, sponsored by Dr. Lowman of Los Angeles and in 1930 Dr. Bennett of Johns Hopkins brought out the long immobilization treatment. Now we are back to the immediate active treatment.

All of these methods have found support from the research in physiology of muscle and nerve. If we have an idea, we can always find support of the idea from the extensive amount of research going on. Because we are not always following the same pattern, they do not always come to the same result.

One point I would like to make is that we are discussing is treatment of acute poliomyelitis. It should not include the whole care of crippled children, even from infantile paralysis.

As far as the Kenny treatment is concerned, it has certain valuable phases that we should accept and try out. However, we should not use it without some rational background. I heard not long ago about a poliomyelitis patient with a temperature of 106 F. being treated with fomentation. They about burned him up and he died. So when you have these new ideas to play with, I think you should not throw away all the background and accumulative experience we have gained over previous years.

However, I, as I suppose most all the people interested in poliomyelitis all over the country, am going to try out these new ideas of hot fomentations and immediate active exercise and it is only after we have tried it out and have had support for the ideas that we will know how much better it is than previous attempts along the same line.

Dr. Don Gudakunst (New York, N. Y.): I came here to learn something about poliomyelitis, to learn how to treat it. I do welcome this opportunity of meeting with you.

I think it is remarkable that the method introduced for the treatment of this disease by Kenny has been so well accepted by the medical profession as a whole. You men and women who have a special part to play in this have also accepted these ideas.

You are, however, faced with the problem that I wish to emphasize. The lay publicity on this has been bad. It is going to be still worse. I have seen articles in manuscript form that are scheduled to be printed in some of our national journals in the next few weeks or months that are worse than anything that has been out before.

This treatment is being taken up by people who are unqualified to practice medicine. They are using as their argument that they have a license in certain states. They are backing that argument up by saying that here is an admittedly great contribution that has been made by a nurse with whom they think they are comparable in point of training. "Therefore, all of our ideas must be similarly good and our methods of procedure must be similarly good." She had to shout for twenty or thirty years before she had recognition as to the value which she had to give us.

This lay publicity places a tremendous obligation on those who are specializing in physical therapy. It behooves us to use every effort to keep this method from being spoiled, to keep the whole thing from being taken up by unqualified practitioners, to the detriment not only of the patient but of physical therapy as a scientific profession.

You have a task of teaching and of preaching, lending your assistance to the National Foundation for Infantile Paralysis in seeing that this work is kept within bounds, that it is made an adjunct of medical teaching, nursing education, physical therapy technician training.

I think that is an important thing that we need to stress and bear in mind. Let's keep the good of this and not get too much of the bad.

Dr. Jessie Wright (Closing): Dr. Troedsson asked about microscopic study of muscles in spasm during the acute stage. We plan to take specimens this year during the seasonal outbreak; but we have not come across many cases of infantile paralysis so far and those we have seen have had predominating bulbar symptoms and have not presented any muscle that would be particularly suitable for specimens. We do have such a study in mind.

Dr. Miland E. Knapp (Closing): There are two points I would like to make. Dr. Troedsson mentioned that the Kenny technic was a rigid routine. I would like to straighten him out on that point, because it is far from a rigid routine. Of course, it is difficult to get an idea across without being dogmatic about it, and probably we have all been guilty of that error, but the routine is changed to fit the patient. It is a symptomatic treatment and the treatment is changed to suit the symptoms. There may be no packs for a period of time, or they may be given at any interval from ten minutes to two hours. The reeducation may be given for a while and then stopped temporarily. There are various cases, fitting the treatment to the patient.

I would like to get rid of the idea that treatment consists of hot packs and passive motion, which I have heard so often.

(*Continued on page 679*)

MEDICAL NEWS

Committees for 1943
American Congress of Physical Therapy

Advances in Education

Earl C. Elkins, M.D., *Chairman.*
Frances Baker, M.D.
Robert L. Bennett, M.D.
Catherine West, M.D.

Constitution and By-Laws

Norman E. Titus, M.D., *Chairman.*
John S. Coulter, M.D.
Frank H. Ewerhardt, M.D.

Cooperation with Army, Navy, Public Health and Veterans Administration

John S. Coulter, M.D., *Chairman.*
Charles R. Brooke, M.D.
Norman E. Titus, M.D.

Finance Committee

Frank H. Krusen, M.D., *Chairman.*
Roy W. Fouts, M.D.
Frank H. Ewerhardt, M.D.

Legislation

Edwin L. Libbert, M.D., *Chairman.*
Muriel Downer, M.D.
Milton G. Schmitt, M.D.

Medical Economics

Madge C. L. McGuinness, M.D., *Chairman.*
David E. Jones, M.D.
William D. Paul, M.D.

Meeting Place

Walter J. Zeiter, M.D., *Chairman.*
Albert A. Martucci, M.D.
J. Wayne McFarland, M.D.
Frederick L. Wahrer, M.D.

Membership

Richard Kovács, M.D., *Chairman.*
John S. Hibben, M.D.
Jessie Wright, M.D.
Walter M. Solomon, M.D.

Nominating

Frank H. Krusen, M.D., *Chairman.*
Clarence W. Dail, M.D.
Charles O. Molander, M.D.
Bror S. Troedsson, M.D.
Nathan H. Polmer, M.D.

Problems Affecting Technicians

Nathan H. Polmer, M.D., *Chairman.*
William H. Northway, M.D.
Miland E. Knapp, M.D.

Public Relations

William H. Schmidt, M.D., *Chairman.*
H. Worley Kendell, M.D.
K. G. Hansson, M.D.

Scientific Exhibits and Gold Key Awards

Miland E. Knapp, *Chairman.*
Disraeli Kobak, M.D.
G. J. P. Barger, M.D.
John S. Coulter, M.D.
O. Leonard Huddleston, M.D.

American Congress of Physical Therapy
Section Officers
1943

Eastern Section

Chairman — Isadore Levin, M.D.
Secretary — Madge C. L. McGuinness, M.D., 1211 Madison Avenue, New York, N. Y.

Mid-Western Section

Chairman — M. K. Newman, M.D.
Secretary — William D. Paul, M.D., 120 Golfview, Iowa City, Ia.

Southern Section

Chairman — Nathan H. Polmer, M.D.
Secretary — Robert L. Bennett, M.D., Georgia Warm Springs, Warm Springs, Ga.

Southeastern Section

Chairman — John J. McGuire, M.D.
Secretary — Emil J. C. Hildenbrand, M.D., 4201 Fessenden St., N. W., Washington, D. C.

Western Section

Chairman — Frances Baker, M.D.
Secretary — John Severy Hibben, M.D., 201 N. El Molino, Pasadena, Calif.

Physical Therapy Section
Southern Medical Association

At the recent meeting held in Richmond, the following were elected officers of the Physical Therapy Section of the Southern Medical Association:

Chairman — Emil J. C. Hildenbrand, M.D., Washington, D. C.

Vice-Chairman — Nathan H. Polmer, M.D., New Orleans, La.

Secertary — Robert L. Bennett, M.D., Warm Springs, Ga.

Dr. Kovacs Addresses Hospital

Dr. Richard Kovacs of New York, N. Y., gave a talk and demonstration on the early treatment of infantile paralysis by physical therapy before the staff of the St. Charles Hospital for Crippled Children, Port Jefferson, Long Island, N. Y., on November 7, 1942.

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ARCHIVES of PHYSICAL THERAPY

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL THERAPY

.·. EDITORIALS .·.

MODERN CONCEPTS OF INFANTILE PARALYSIS

No theory of treatment of any single disease or its after-effects has aroused more controversy among the members of the medical profession or stimulated more interest in the minds of the lay-public than has the work of Miss Elizabeth Kenny. Significant though the work of Miss Kenny is, it does not completely solve the problem of infantile paralysis. As reported by Dr. Knapp in the symposium published in this tissue, the Kenny treatment is applicable only to the alleviation of the *after-effects* of acute anterior poliomyelitis. The earlier in the acute stage the treatment can be begun, the more effective it is.

The theory espoused by Miss Kenny hypothecates spasm of muscles which are not actually paralyzed but in which there may be local inflammation as well as over stimulation produced by irritation of various regions of the spinal cord. Definite pathologic changes in the muscles have been reported by Hipps and confirmed by Jessie Wright whose studies are also reported in this issue.

Drs. Knapp, Pohl, Cole, Lewin, Krusen and many others agree that repeated packing with hot fomentations will relieve pain and muscle spasm. "Mental alienation" and "muscle incoordination" are the second and third cardinal symptoms which may be relieved by Kenny therapy. The tissue turgor of patients treated by moist fomentations is definitely better than has been found in other patients treated by methods more commonly used before Kenny. Cold, blue, atrophic extremities are rarely seen in Kenny treated patients.

There are certain elements of the program recommended by Miss Kenny which, as a physician who was first trained as a physiologist, I cannot accept, although I have been ridiculed by one of the more ardent Kenny followers who suggested that I was "mired, not grounded, in physiology." The pull of a respirator cannot be so harmful to intercostal muscles which are in spasm that its use should be denied to all patients, including those who have actual paralysis of the diaphragm. Hot fomentations may be applied in a respirator which is at the same time keeping the *patient alive* by providing an adequate exchange of air. Contrary to the impression created by articles in the lay-press, Kenny therapy does not cure all patients. Some are left permanently paralyzed.

Prevention is always better than cure, but it is less spectacular. Gudakunst has emphasized the need for continued study of the virus and also the after-effects of acute anterior poliomyelitis. Thousands of dollars and years of research by some of the best scientists of this century have brought answers to only a few of the many problems presented by acute anterior poliomyelitis. Perhaps the day will come when we shall have a vaccine or toxoid which is effective in bringing about immunity to the disease. This will reduce, but not eliminate the need for methods of treating acute "Polio" or its after-effects.

The method of Kenny is not a cure. It does reduce the incidence or severity of the paralysis. Some patients who have been treated by Miss Kenny herself from the time of onset of the disease remain paralyzed. Some will require braces or operations. The actual value of the treatment has not been determined by observing a controlled series of cases. Toomey has described a

method of care which differs in many respects from the Kenny plan. Yet the results which he reports are excellent. A comparative study of the two methods in the same year and same community would be of interest and might prove to be of great value.

Since Miss Kenny objects to the more commonly used plan of muscle testing and charting, some other means of grading muscles must be evolved or her objections must be ignored. We cannot continue to make broad statements and generalizations about *cures* without having a *record* of the extent of the involvement before and after treatment. Miss Kenny does examine her patients. If she will evolve a method of *charting* the findings she will have a basis for determining the accuracy of her conclusions.

Few orthopaedic surgeons will be willing to *shock* injured muscles with 20 to 100 volts of electricity as has been described by Toomey. Such muscle testing may be definitely harmful. Most will agree with Miss Kenny that in all of our work with these patients we must be very gentle if we hope to prevent additional injury to peripheral muscles or nerve endings.

Whether or not we are antagonized by her belligerent attitude, reject her theories, or admire her courage and her perseverance, the methods of Kenny are definitely established until something better is found.

The lay-public is now fully convinced, by exaggerated statements in the lay-press, that the Kenny treatment is a sure-fire cure. Moreover, competent and reliable physicians who have observed the method for long periods of time have been favorably impressed.

The demand for technicians and nurses who are trained in the method exceeds the supply. In addition to the Kenny school at the University of Minnesota, centers for training nurses and technicians in the discipline of the method have been established by the National Foundation for Infantile Paralysis in several cities including Warm Springs, Georgia; Cleveland, and Northwestern University in Chicago. If the 1943 season brings an epidemic of "Polio" cases, we will be more adequately prepared to combat it than in any year of the past. For this we must thank both the National Foundation for Infantile Paralysis and affiliated chapters and Miss Elizabeth Kenny.

EDWARD L. COMPERE, M.D.,
Chicago, Illinois.

THE NEW INTENSIVE TREATMENT HOSPITAL

All physicians who are concerned with physical therapy will watch with interest the work of the new Intensive Treatment Hospital in Chicago. This hospital (remodeled from the old Wesley Hospital) will be under the medical directorship of Dr. Worley Kendell, one of the officers of the American Congress of Physical Therapy.

The purpose of the hospital will be to employ intensive treatment for patients suffering from gonorrhea who have failed to respond to chemotherapy, and for patients who give unequivocal evidence of early syphilis. The staff will be provided by the United States Public Health Service, and the physicians who will serve at this institution will be commissioned as officers in the United States Public Health Service. There will be an opportunity to do considerable research work in venereal disease therapy and all types of therapeutic procedure will be employed, including the use of physical hyperpyrexia. Already eighteen expert fever therapy technicians have been engaged to serve in this hospital and there will be a permanent staff of five or six specially trained physicians. Research laboratories and follow-up services

will be included at the institution, and a picked group of medical consultants will also assist in the work.

It is planned to treat about 150 syphilitic patients and fifty patients suffering from resistant gonorrhea each week. This extensive investigation should throw new light on the clinical aspects of the intensive treatment of venereal disease and should eventually settle, once and for all, the problems with regard to the exact role of physical fevers in the treatment of venereal disease. For this reason, everyone will watch the work at this new hospital with intense interest, and those of us who know Dr. Kendell feel certain that his difficult task will be brought to a successful conclusion and that he will make a distinctive and lasting contribution concerning the care of venereal disease and the place of physical fevers in such care. Our sincere congratulations go to Dr. Kendell and we are proud to know that one of our officers has been entrusted with the direction of such an important piece of investigation. It may be that his work will revolutionize the treatment of venereal diseases.

Discussions of Papers by Drs. John A. Toomey, Jessie Wright and Miland E. Knapp

(Continued from Page 675)

It is not hot packs and passive motion. It is an attempt to treat the disease systematically. There is at present no adequate and well proved foundation for the method. That has to come in the future. My hope is that much simpler methods will be devised in the future to accomplish the same ends.

However, I think you will all have to admit whether you are in favor of this method of treatment or some other method of treatment, or if you are interested in poliomyelitis only from the abstract point of view, that Sister Kenny did help us in one thing in coming here and that was to "knock" everyone out of his mental rut. That was done efficiently. So I think there is no doubt but that advance in the treatment of infantile paralysis will follow this work.

NOTICE TO REGISTERED TECHNICIANS

It may be that the manufacture of the official pin of the American Registry of Physical Therapy Technicians will be stopped for the duration. The firm who make the pin has asked that a future order to cover the anticipated need for the duration be placed at this time. We are reluctant to place a large order. Therefore if you plan to have this emblem and especially if you want this for Christmas gift purposes, please place your order as soon as possible. Further information may be found on page 579 this issue.

Special Article

THE NEED FOR PHYSICAL THERAPY AIDES IN THE WAR EFFORT

In the modern military hospital, the department of physical therapy plays an important part. Injuries commonly encountered in military hospitals often require physical treatment during the stage of rehabilitation. During the last war it was estimated that 50,000 to 75,000 patients requiring reconstructive treatment would be received per year for each 1,000,000 men overseas; and by June, 1919, 700 reconstruction aides of physical therapy aides were devoting their time to rehabilitation of the wounded.

In a recent survey, Coulter and Carter[1] reported the following demand for physical therapy aides:

United States Public Health Service	14
United States Veterans' Administration	70
Civilian Hospitals	292
United States Army Medical Corps	778
Total	1,154*

Recent official Army communications mention the "dire shortage of trained girls for this immense effort," and state that because of this shortage "something must be done and must be done immediately."

Persons Eligible to Fill Positions as Student Physical Therapy Aides

At present, the greatest demand for physical therapy aides is in the Army. On September 1, 1942, it was announced through the United States Civil Service Commission that "applications will be accepted from women only."

In order to enter an approved school for physical therapy aides, an applicant must have fulfilled certain requirements with regard to preliminary education. The minimal amount of training which is acceptable in several of the approved schools is (1) two years or sixty semester hours of work in an approved college including satisfactory courses in biology and other sciences (only *college* courses are acceptable); or a woman may enter an approved school for physical therapy aides if she has completed (2) a four-year course in physical education in a recognized university or college, or she may enter an approved school for physical therapy aides if she has (3) graduated from an accredited school of nursing.

The following courses are *not* acceptable for admission to an approved school for student physical therapy aides: Correspondence courses, nurses' aide courses, "Swedish massage" courses, "manual therapy" courses, practical nursing or the like.

Although nurses are eligible for admission to most schools, they are urgently needed at present in the Army and Navy Nurses Corps. Student physical therapy aides, therefore, must be drawn largely from the group of women who have graduated in physical education or who have the minimal requirement of two years of college work, including satisfactory biology and other sciences.

"Biology" refers to any course in the biologic sciences, such as zoology, botany, anatomy or animal biology. Students who have two years of college

* Although the Navy had previously stated that it would need no physical therapy technicians, other than those trained in its own corps men's schools, word has just been received that the Navy has issued an urgent call for female physical therapy technicians to enlist in the hospital corps women's reserve.

work including some science courses, especially in the biologic sciences, should apply to one of the approved schools for physical therapy technical aides for evaluation of their credentials. Each school will specify the number of required credits in the various subjects which the applicant must present for admission.

It has been absolutely essential to set certain standards; no substitute training can be considered acceptable. The applicant must have had training in one of the three categories mentioned in an earlier paragraph. Applicants who desire to enter an Army hospital may be married or single; must have reached their twentieth birthday; must be citizens of, or owe allegiance to, the United States; must be in sound physical health, and must be capable of performing ardous duty. The Civil Service Commission announced recently that there is now no maximal age limit, but individual schools or the Army still may have a maximal age limit for admission. The upper age limit for physical therapy aides in the Army hospitals is now tentatively fixed at 45 years.

Those who desire to enter an Army hospital will be disqualified for appointment if they have organic heart disease, hernia, weak feet or other serious physical defects. Vision must be at least 20/200 (Snellen) in each eye, corrected to at least 20/20 (Snellen) in one eye and 20/40 (Snellen) in the other eye; except that persons whose vision with glasses meets this requirement or whose vision without glasses is less than 20/200 (Snellen) in each eye will not be accepted in the Army hospitals "until satisfactory evidence has been presented to the Commission showing that there is no disease or defect of the eye other than an error of refraction." Ordinary conversation must be heard and understood at a distance of at least 15 feet (4.6 meters) with one ear.

Before entering an Army hospital, an applicant must submit "a report on the applicant's own blood of a Wassermann, Kahn or Kline test for syphilis; and a report of normal x-ray findings of the applicant's chest; each examination to have been made within one month immediately preceding a date of entrance on duty." A rigid physical examination will be made before appointment.

Although other governmental hospitals have not placed any restriction on height, and although the Civil Service Commission has no restriction on height for physical therapy aides or apprentice physical therapy aides, the Army hospitals will not accept persons whose height is less than 5 feet 2 inches. Other government hospitals and civilian hospitals may accept persons who are less than 5 feet 2 inches in height.

Applicants who are finally accepted into Army hospitals will receive appointments which will be known as "war service appointments." Such appointments will be for the duration of the war, and "in no case will extend more than six months beyond the end of the war."

Where One Can Obtain Training as a Physical Therapy Technical Aide

At the present time, there are twenty approved schools for physical therapy technicians (or physical therapy aides, as they are called in the Army). Ten of these schools now are offering emergency courses of six months' duration in order to qualify persons to enter Army hospitals as apprentice physical therapy aides. These courses are expected to continue for the duration of the emergency. A list of the schools, together with entrance requirements, duration of regular and emergency courses, time of admission, tuition and so forth, is given in table 1.

TABLE 1. — *Schools Approved for Training Physical Therapy Technicians by the Council on Medical Education and Hospitals*

Name and Location of School	Medical Director	Entrance Requirements *	Duration and Time of Admissions Regular Course	Duration and Time of Admissions Emergency Course	Tuition †
Children's Hospital, Los Angeles	Steele F. Stewart, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	12 mos. Feb. and Sept.	6 mos. Feb. and Sept.	$200 R $200 E
College of Medical Evangelists, Los Angeles	Fred B. Moor, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	12 mos.	.....	.....
Stanford University California	William H. Northway, M.D.	(a) R. N. (b) Phys. educ. major (c) 3 yrs. coll.	12 mos. Jan. and June	7 mos. Jan. and June	$429 R $286 E
Walter Reed General Hospital, Wash., D.C.	B. A. Strickland, Jr., Capt., M. C.	Phys. educ. major	.....	6 mos. Quarterly	None
Northwestern Univ. Medical School, Chgo.	John S. Coulter, M.D.	(a) R. N. (b) Phys. educ. major (c) 3 yrs. coll.	9 mos. Oct.	6 mos. Jan. and July	$200 R $200 E
Bouvé-Boston School of Physical Education, Boston	Arthur L. Watkins, M.D.	High school grad.	3 yrs. 4 yrs. ‡ Sept.	6 mos.	$400 R ? E
Harvard Medical School, Boston	Frank R. Ober, M.D.	(a) R. N. (b) Phys. educ. major 2 yrs. coll.§	9 mos. Sept. and March	6 mos. Sept. and March	$200 R $200 E
Boston Univ. Sargent College of Physical Education, Cambridge, Mass.	Louis Howard, M.D.	2 yrs. coll.	2 yrs. Oct.	‖	$547
University of Minn., Minneapolis	M. E. Knapp, M.D.	(a) R. N. (b) Phys. educ. major (c) Med. tech. grad. with B.S. degree	12 mos. June and Sept.	.....	Univ. fees
Mayo Clinic, Rochester, Minn.	Frank H. Krusen, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	.....	6 mos. Jan. and July	None
Barnes Hospital, St. Louis	Frank H. Ewerhardt, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	9 mos.	.....	.....
St. Louis University, School of Nursing, St. Louis	Alexander J. Kotkis, M.D.	High school grad.	4 yrs. Jan. and Sept.	.....	$250 yr.
University of Buffalo, School of Nursing, Buffalo	George G. Martin, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	12 mos. Feb. and Sept.	6 mos. Feb. and Sept.	$425 R $375 E
Hospital for Special Surgery, New York City	Kristian G. Hansson, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	9 mos. Sept.	6 mos. Sept.	$300 R $200 E
New York University, New York City	William Bierman, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	9 mos.	.....	.....
D. T. Watson School of Physiotherapy, Leetsdale, Pa.	Jessie Wright, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll. ¶	2 yrs. Sept.	6 mos. Jan. and July	None R $200 E
Richmond Professional Institute of the College of William and Mary, Richmond, Va.	Thomas W. Wheeldon, M.D.	(a) R. N. (b) Phys. educ. major (c) Coll. graduate (d) High school grad.	8 mos. 4 yrs. Feb. and Sept.	.....	Coll. fees
University of Wisconsin Medical School, Madison	Ernst A. Pohle, M.D.	(a) R. N. (b) Phys. educ. major	12 mos. Feb. and Sept.	6 mos.	Univ. fees R
University of California Hospital, San Francisco	Frances Baker, M.D.	(a) R. N. (b) Phys. educ. major (c) B. A. degree **	48 wks. October	.....	$150.00
Cleveland Clinic Foundation Hospital, Cleveland, Ohio	Walter J. Zeiter, M.D.	(a) R. N. (b) Phys. educ. major (c) 2 yrs. coll.	9 mos. July	.....	None

* Courses are so arranged that any of the entrance requirements (a, b, c or d) will qualify students for training.

** Acceptable science courses required.

† R = regular course; E = emergency course.

‡ Four year course leads to B.S. degree from Simmons College.

§ This group admitted to emergency course only.

‖ Emergency course offered in co-operation with Harvard Medical School.

¶ Only those with three years of college are admitted to emergency course.

According to latest information the Army hospitals which are training *student* physical therapy technical aides at the present time are the Walter Reed General Hospital at Washington, D. C.; Fitzsimons Hospital in Denver, Colorado, and the Army and Navy Hospital at Hot Springs, Arkansas. These schools can accept only fifteen students each quarter, and will admit only persons who "have completed a full four-year course leading to a bachelor's degree in an accredited school of physical education or other recognized university or college, with major study in physical education."

In addition to the new Army schools, new civilian schools recently have been opened under suitable auspices. In all probability, these will be approved at an early date. These schools are: (1) Iowa University, Iowa City, Iowa, Medical Director, W. D. Paul, M.D.; and (2) Columbia University Presbyterian Hospital, New York City, Medical Director, William B. Snow, M.D. The course at Iowa University is free.

Many of the schools which charge tuition have free scholarships available during the present national emergency. Students who are unable to pay tuition should inquire about these free scholarships at the time of making application to the school of their choice.

The prospective student should consult table 1 and *make application directly to the school in which she may be able to qualify.*

It should be observed that most of the schools offer both regular courses which usually last nine or twelve months and emergency courses which last for six months. Students who graduate from *regular* courses can enter civilian hospitals as physical therapy technicians, or they can go directly into the Army hospitals as regular physical therapy aides at $1,800 per annum.

Whenever a student applies for a six months' emergency course, she is required to continue the course for an additional six months as an *apprentice* physical therapy aide in one of the many Army hospitals within the continental limits of the United States. For practical training in governmental service as apprentice physical therapy aides, these persons will receive a salary of $1,440 per year during the six months of governmental apprenticeship. Students who agree to accept appointments as apprentice aides in Army hospitals for six months will be required thereafter to remain in Army hospitals for at least one year more as regular physical therapy aides at $1,800 per annum. Furthermore, they will be expected to remain "at any location required by the Army."

At the present time, physical therapy aides are civilian employes of governmental medical departments. Apprentice physical therapy aides are trained in the numerous Army hospitals within the continental limits of the United States. After successful completion of this training, however, if they are appointed as regular physical therapy aides, they may be assigned to Army hospitals in this country or overseas.

Under the present plan, the young woman interested in this field can apply for service as (1) a student physical therapy aide, (2) an apprentice physical therapy aide, or (3) a regular physical therapy aide. As previously mentioned, to become a student aide, one must fulfill the requirements of one of the nineteen approved schools. To become an apprentice physical therapy aide, one must have completed one of the approved emergency

courses. To become a regular physical therapy aide, one must have graduated from a regulation course in an approved school for physical therapy technicians, or one must have taken a six months' emergency course followed by six months of apprenticeship. There are no substitute courses or equivalent courses acceptable. The Army will not accept as regular physical therapy aides persons who have not trained in an approved school.

After the war is over, there should be ample opportunity for trained aides to continue working in civilian hospitals, veterans' hospitals, crippled children's schools and public health organizations.

All of our schools for physical therapy technical aides *must* receive an adequate supply of students in order that our military hospitals may obtain enough workers. As soon as enough aides can be trained it has been specified that each Army general hospital of 1,000 beds will have a staff of seven physical therapy aides, and each Army expeditionary hospital will have a staff of four physical therapy aides. It is imperative that these needs be met.

Every young woman who has the necessary preliminary education and qualifications, and who is desirous of serving her country during the present war, should consider carefully the possibility of training as a physical therapy aide at one of the approved schools for physical therapy technicians. She should decide whether or not she is capable of accepting training as a physical therapy aide, and should give serious thought to the opportunity of assisting her country's wounded in Military hospitals here or overseas during the present national crisis.

Reference

1. Coulter, J. S., and Carter, H. A.: Need for Physical Therapy Technicians, War Medicine **2**:824 (Sept.) 1942.

Medical News

(Continued from Page 676)

Dr. Ewerhardt Addresses Clinical Conference

At the twelfth annual fall conference of the Oklahoma City Clinical Society, October 26-29, Dr. Frank H. Ewerhardt of St. Louis presented the subject of physical therapy.

Drs. Knapp and Cole to Head Staff at Kenny Hospital

St. Barnabas Hospital announces the opening of the Sheltering Arms Hospital, Minneapolis, for the exclusive care of patients with infantile paralysis under the Sister Kenny treatment. Privately interested persons have already given the $30,000 which is needed at present to finance the project. It is expected that the hospital will be in operation some time in September. A special wing will be devoted to patients in the initial and contagious stages of the disease. St. Barnabas will operate Sheltering Arms, and Dr. Wallace H. Cole, professor and director of the department of orthopedic surgery, and Dr. Miland E. Knapp, head of the department of physical therapy, University of Minnesota Medical School, Minneapolis, will be in charge of the staff.

Council Approval for Physical Therapy Courses

The Council on Medical Education and Hospitals has extended its approval for the following regular courses for physical therapy technicians:

University of California Hospital, San Francisco, Frances Baker, M.D., Medical Director;

Cleveland Clinic Foundation Hospital, Cleveland, Ohio, Walter J. Zeiter, M.D., Medical Director.

Posse Institute Closed

Word has been received that Posse Institute, Kendal Green, Massachusetts, which has appeared on the list of approved physical therapy schools, has closed permanently.

Bill to Benefit Civilians

In Congress, medical bill S. 2412 has been ordered favorably reported by the House Committee on Judiciary, a bill to provide benefits, including medical care, for the injury, disability or death of civilians or their detention by the enemy and for the prevention and relief of civilian distress arising out of the present war.

The Penna. Academy of Physical Medicine November Meeting

The regular November meeting of The Penna. Academy of Physical Medicine was held November 19 at the Philadelphia County Medical Building. Dr. Albert A. Martucci talked on "The Kenny Method of Treatment of Infantile Paralysis."

Agreements Between Federal Trade Commission and Promoters of Various Products

The following items are abstracts of stipulations in which promoters of "patent medicines," cosmetics or medical devices have cooperated with the Federal Trade Commission to the extent of agreeing to discontinue certain misrepresentations in their advertising. These stipulations differ from the "Cease and Desist Orders" of the Commission in that such orders definitely direct the discontinuance of misrepresentations. The abstracts that follow are presented primarily to illustrate the effects of the provisions of the Wheeler-Lea Amendment to the Federal Trade Commission Act on the promotion of such products.

Chippewa Natural Spring Water. — This was represented in the advertising to rid the system of poisons, toxins or waste, to be the only natural spring water which can be given to infants without boiling or with safety, and to possess therapeutic properties in the treatment of kidney disorders, rheumatism or arthritis. In June, 1942, the Chippewa Springs Corporation and the Hutchinson Advertising Company, both of Minneapolis, and Vince B. Nyhan, trading as Chippewa Spring Water Company, Chicago, stipulated with the Federal Trade Commission that they would remove the foregoing misrepresentations from their advertising. Further, all these stipulators agreed to cease representing that the minerals contained in competitive commercial waters are of no benefit to the user. The Chippewa Springs Corporation separately stipulated that it would cease representing that Chippewa Natural Spring Water, when eliminated, carries with it more waste matter than do competitive commercial waters.

Natural Ray Mineral Water. — This was sold under the misrepresentations that it is a remedy or cure for stomach, bladder and kidney disorders, chronic constipation, paralysis, high blood pressure, anemia, glandular difficulties and various forms of rheumatism, among other things; that it is a safeguard, a body builder, a way to gain, retain or maintain health, a preventive of infantile paralysis or other illness or an aid to muscle or bone development, that it affects the appetite, the weight or the ability to sleep, builds up resistance to colds or headaches or wards off colds. Such misrepresentations were to be discontinued according to a stipulation

signed with the Federal Trade Commission in August, 1941, by the Michigan Magnetic Water Company and the Natural Ray Mineral Water Company, the latter trading as such and as the Michigan Mineral Water Company, of St. Louis. In September, 1941, Charles F. Dowd, Inc., Toledo, Ohio, which handles the advertising of the product in question also stipulated with the Federal Trade Commission that the foregoing misrepresentations would be discontinued.

Dr. McKenzie's Sanitary Health Sox. — In April, 1942, one David M. Conn, wholesaler of hosiery, New York, stipulated with the Federal Trade Commission that he would cease using the abbreviation "Dr." or the word "Doctor" either with or without the name "McKenzie" in the trade style for this hosiery, which use might imply that there is a physician connected with the manufacture of this product or that the hosiery has been made under the supervision of a physician. Conn further agreed to cease using the word "Health" as part of the trade name or as descriptive of his hosiery products, or any other implication that his merchandise has special health features capable of warding off or ameliorating disease or pain.

Dr. Merritt's Health Shoes. — Because these have not been designed or made under the supervision of a physician and do not possess special scientific, orthopedic or health features which are the result of medical determination or service, the Merritt Shoe Company, Inc., Boston, signed a stipulation with the Federal Trade Commission in April, 1942, in which it agreed to discontinue use of the terms "Doctor," "Dr." and "Health" from the name of its shoes.

Muscle-Rub. — In May, 1942, Herman H. Kronberg, trading as Muscle-Rub Company, Inc., Philadelphia, stipulated with the Federal Trade Commission that in the advertising of this rubefacient he would no longer represent that it is a new discovery or is effective in relief of pain due to rheumatism, lumbago, neuritis, sciatica, neuralgia or lameness, or possesses any value in excess of giving temporary relief as a mild counterirritant rub in those cases of minor pain or discomfort where use of this type of preparation is indicated. In two instances in 1935 the Food and Drug Administration reported that it had taken action against Kronberg, then trading as Roo-Mo-Rub Corporation, Philadelphia, because of false claims made on the labels of an alleged rheumatism cure that he was then selling as "Roo-Mo-Rub." Government chemists reported that it was a mixture of alcohol (80 per cent), water and a small amount of wintergreen oil.

Perspir-ator. — This Turkish bath cabinet was represented in the advertising as a cure or remedy for excess fat, which would keep the pores open, cure colds and help to replace sallow, sluggish skin with a healthy, youthful glow and to remove blackheads and the cause of skin blemishes. In a stipulation signed with the Federal Trade Commission in June, 1942, Louis Gordon, trading as Gordon Brothers, Brooklyn, agreed to discontinue these misrepresentations and any advertisements which failed to reveal that a normal person might faint and suffer burns when using the device unattended. It was permitted, however, to limit this warning to the statement, "Caution, use only as directed," if the accompanying directions contained the adequate, necessary warning.

Physique Control Course, Health-O-Flex System Courses and Health-O-Flexer. — One Anthony Matysek, trading as Antone Matysek, Baltimore, puts these out, the first in the form of a booklet, the second as a course of instruction and the third as an exercising device. In a stipulation which he signed with the Federal Trade Commission in February, 1942, he agreed to discontinue the following advertising representations: That the booklet reveals new strength secrets and will enable one to build up the body, revitalize the spine, heart, lungs, kidneys, muscles and glands, increase vitality, create perfect circulation and correct rounded shoulders; that the Health-O-Flex System Courses teach one how to make his weakest spots his strongest or increase his strength and endurance; that the Health-O-Flexer constitutes an improved method of physical culture or gives strength, health or attractiveness to the body; that it reactivates the glands or ligaments, invigorates the internal organs, helps to eliminate surgical operations and the use of drugs and medicines, prevents colds, headaches, backaches, weakness or suffering and increases or reduces the weight as desired. Matysek further agreed to cease representing that any specific results claimed for his products are guaranteed or that any offer he made was limited as to time, when such was not a fact. — [Reprinted with permission, J. A. M. A. **119**:1443 (Aug. 22); **120**:225 (Sept. 19), and **120**:470 (Oct. 10) 1942.]

Vocational Rehabilitation

Public hearings are being held by a subcommittee of the House Committee on Education on H. R. 7484, a bill providing for the vocational rehabilitation of individuals suffering from war connected with other disabilities. Bill S. 2814, introduced by Senator Walsh, Massachusetts, for himself and Senator Clark of Missouri, and H. R. 7618, introduced by Representative Rankin, Mississippi, provide for the rehabilitation in civil employment of persons disabled in the active military or naval service in the present war.

The Student Loan Fund Appointments

Paul V. McNutt, Federal Security Administrator, announced on October 10 the appointment of Kendric N. Marshall, former president of Chevy Chase Junior College of Washington, D. C., to direct the new student loan fund program. Mr. Marshall will administer the $5,000,000 loan fund provided by Congress to enable students to complete their technical or professional education in fields essential to the war effort. He will be assisted by Ralph C. Flynt, formerly of the Education Division of the Civilian Conservation Corps,

who will act as one of four liaison agents between the participating colleges and universities and the Office of Education. Rosa Lee Walston, formerly dean of women at Alabama Polytechnic Institute, will have charge of aid for women students. Ruth Grout, a graduate of the School of Public Health at Yale University and formerly supervisor of health education at the Tennessee Valley Authority at Knoxville, Tenn., has been appointed consultant in health education.

General Limitation Order on X-Ray Equipment

The manufacture and purchase of x-ray equipment will be circumscribed under General Limitation Order L-206, issued by the War Production Board under date of October 20. Within the meaning of this order, x-ray equipment includes the following radiographic equipment, fluoroscopic equipment and therapy equipment; power units; radiographic, fluoroscopic and therapy tables; photofluorographic units; cassette changers; tube stands; stationary grids, and Bucky diaphragms. The order does not apply to use of rebuilt equipment or to any parts, accessories or appliances used in connection with radiography, fluoroscopy or therapy other than the items specifically named.

The order provides that no manufacturer shall manufacture or assemble any models or types of x-ray equipment other than the permitted number of models or the types set forth and described in a schedule published concurrently with the order. No person may sell transfer or deliver any x-ray equipment except:

"(i) To the Army or Navy of the United States, the United States Maritime Commission and the War Shipping Administration, or

"(ii) To persons (such as hospitals, medical departments of industrial concerns, and other persons desiring to receive x-ray equipment) who have filed Form PD-556 . . . and have been specifically authorized on such form by the Director General for Operations to receive x-ray equipment."

Each person seeking authorization to receive x-ray equipment must prepare Form PD-556, copies of which may be obtained at the local offices of the War Production Board in the manner prescribed in the form. The form should be filed only by the person desiring to receive x-ray equipment and not by the person who makes delivery of such equipment. The application must state whether or not the applicant has in use any x-ray equipment as defined in the order and if so must give a description of it, must state the average number of patients per week on which such equipment is used and whether the equipment applied for would be used to replace existing equipment or is needed for expansion of existing facilities. The order form must show how the applicant accomplishes the work for which the equipment applied for would be used and must indicate what attempts have been made to obtain used or rebuilt equipment.

Any person affected by the order who considers that compliance therewith will work an exceptional and unreasonable hardship on him may apply to the War Production Board setting forth the pertinent facts and the reasons such person considers that he is entitled to relief. The Director General for Operations may thereupon take such action as he deems appropriate. The order and all transactions affected thereby are subject to all applicable provisions of the Priorities Regulations of the War Production Board.—[Reprinted with permission, J. A. M. A. **120**:705 (Oct. 31) 1942.]

Committee on Health, Physical Education and Recreation

The Board of Trustees of the American Medical Association at its session of September 17 and 18 appointed the following to serve on a committee established by the American Association for Health, Physical Education and Recreation: Dr. W. W. Bauer, Director of the Bureau of Health Education; Dr. John S. Coulter of Chicago, Dr. Peter J. Steincrohn of Hartford, Conn., and Dr. H. A. Christian of Brookline, Mass. The purpose is to frame a simple definition and statement for the use of health educators on the value of dangers and limitations of exercise.

Courses in Neurologic Surgery for Army Doctors

Twenty-five U. S. Army medical officers from various parts of the United States began a course of training in neurology and neurologic surgery at the University of Illinois College of Medicine, Chicago, September 28. Similar groups of army officers will be trained during the next few months. The course includes laboratory, clinical and lecture work at the Neuropsychiatric Institute at the university and also clinical work at Cook County Hospital.

Medicolegal Abstracts

Osteopathy: Use of Drugs and Practice of Surgery Denied to Osteopaths. — The defendant Moore, a licensed osteopath, was charged with practicing medicine and surgery without a license in that he "prescribed and recommended for a fee, drugs and medicines found in and comprising a part of materia medica" in at least two specific instances. The defendant Muecke, a licensed osteopath, was charged with practicing medicine and surgery without a license in that he performed surgical operations for the removal of tonsils in certain specific instances, used the title "physician and surgeon" in connection with his name and represented that he was engaged in the practice of medicine and surgery. Both defendants, by way of defense, alleged that they were duly licensed to practice osteopathy and that the doing and performing of the acts charged constituted the practice of osteopathy as taught

and practiced in legally incorporated colleges of osteopathy of good repute. In each case the trial court sustained a motion to strike from the answer these allegations, and the defendants appealed to the Supreme Court of Kansas.

The issue in these cases was the same and they were argued together. Essentially, the court was presented with this question: Does a license authorizing the holder to practice osteopathy as taught in osteopathic schools confer the right to use drugs and to practice operative surgery? In answering this question, the Supreme Court reviewed its previous decisions involving the scope of osteopathy and well considered decisions in other jurisdictions and pointed out that all such decisions distinguish the practice of osteopathy from the practice of medicine and surgery. Referring particularly to the Kansas law, the court said that the words of a statute must be taken in the sense in which they were understood at the time the statute was enacted and that the effect of the words in the osteopathic act authorizing licentiates to practice "as taught and practiced in the legally incorporated colleges of osteopathy of good repute" was not to set at large the settled meaning of osteopathy and obliterate the distinction between the practice of osteopathy and the practice of medicine and surgery. Under the act, the examining and licensing board is authorized to grant certificates to practice osteopathy only to persons who have met certain requirements. Those who have not met these requirements and who have not graduated from an osteopathic school or college of good repute are not eligible to receive a certificate. The obvious purpose of the legislature, continued the court, was to exclude the unfit and thus protect the osteopathic profession as well as the public. The purpose was not to enlarge the meaning of osteopathy but to guard that profession from applicants who had graduated from schools of low standards that purported to teach osteopathy.

We have, the court said, set forth authoritative definitions of osteopathy. To be a reputable college of osteopathy within the meaning of the Kansas statute the course of study taught and practiced must conform to those definitions. The theory of the defendants that they may practice whatever might be taught in such schools cannot be sustained. To say that the scope of practice of an osteopath in Kansas is measured by what is or may be taught in osteopathic colleges of good repute would be the equivalent of saying that the law of Kansas fixing the boundary line between the practice of medicine and surgery and the practice of osteopathy must be determined by the shift in the subjects taught in an unknown number of colleges in an unknown number of states. The court could find no warrant for such a contention based on any proper construction of the statutes. Nor did the court agree with the contention that the proper construction of a statute is a question of fact for the jury, not a question of law for the court. If such a contention were true, the court pointed out, the law would be as chameleon hued as the various verdicts of successive juries.

The court concluded, therefore, that while the defendants were authorized to practice osteopathy they were not authorized to practice medicine and surgery, that the acts charged constituted the practice of medicine and surgery and that the trial court did not err in striking the defendants' answers, since those answers constituted a mere conclusion of law and were no defense to the acts charged. The court could find no authority in the Kansas law for the limited use of medicine and surgery contended for by the defendants and said that it was beyond the power of the court to write an exception into the statute, such an exception being a matter for the consideration of the legislature, not the courts. The order of the trial court in sustaining the motion to strike the answer, concluded the Supreme Court, was not an appealable order and the appeal was dismissed. — *State ex rel. Wheat, Co. Atty. v. Moore and State ex rel. Cobean, Co. Atty. v. Muecke*, 117 P. (2d) 598 (Kan., 1941). — [Reprinted with permission, J. A. M. A. **120**:716 (Oct. 31) 1942.]

Emergency Base Hospitals

The Medical Division of the U. S. Office of Civilian Defense, through its regional medical officers and state chiefs of Emergency Medical Service, has now made emergency provision for the establishment of a chain of emergency base hospitals in the interior of all the coastal states. They will be activated only in the event of an enemy attack on our coast which necessitates the evacuation of coastal hospitals. Each base hospital will be related to the casualty receiving hospital which has been evacuated, and it is expected that the staff will be recruited largely from the parent institution.

In order to meet a sudden and unexpected crisis without delay, arrangements have been completed with state authorities for the prompt taking over of appropriate institutions in the interior of the state for this purpose and with local military establishments for the transportation of casualties and other hospitalized persons along appropriate lines of evacuation.

More than one hundred and fifty hospitals in the coastal cities are in the process of organizing small affiliated units of physicians and surgeons, which will be prepared to staff the Emergency Base Hospitals if they should be needed. These units are composed of the older members of the staff and those with physical disabilities which render them ineligible for military service, and of women physicians. In order that a balanced professional team may be immediately available the doctors comprising units are being commissioned in the inactive reserve of the U. S. Public Health Service so that, if called to duty, they may receive the rank, pay and allowances equivalent to those of an officer in the armed forces. Dr. George Baehr, chief medical officer of the U. S.

Office of Civilian Defense, states that the members of these affiliated hospital units will continue to remain on an inactive status for the duration of the war unless a serious enemy attack occurs in their region which necessitates the transfer of casualties to protected sites in the interior. Their commissions may be terminated on their request six months after the end of the war, or sooner, if approved by the Surgeon General. Such approval will be given in the event such officer desires active duty in the Army or Navy.—[Reprinted with permission, J. A. M. A. **120**:714 (Oct. 31) 1942.]

Cease and Desist Orders — Abstracts of Certain Federal Trade Commission Releases

The work of the Federal Trade Commission, in helping to protect the public against misrepresentation or fraud in the medical as well as other fields, has been greatly extended by the provisions of the Wheeler-Lea Amendment of the Federal Trade Commission Act. The Food, Drug and Cosmetic Act of 1938 added to the Food and Drug Administration's control of the advertising claims and statements made on the labels of medicine or on the carton or in the accompanying leaflet, whereas what might be termed collateral advertising, that which appears in circulars, newspapers and magazines and over the air, comes more actively under the purview of the Federal Trade Commission by virtue of the Wheeler-Lea Amendment.

Houston's Mineral Water. — W. T. Houston, trading as Houston Mineral Well, Newmarket, Tenn.; complaint issued Aug. 22, 1941, order issued June 6, 1942. Order prohibited misrepresentations that this water had any value in treating disease in excess of action of ordinary drinking water; was efficacious in kidney, gall bladder and stomach disorders or diabetes or contained any ingredient which would supply a deficiency of insulin or enable a diabetic person to discontinue the use of insulin; that the product would have any effect in treating blood pressure or ailments of the prostate gland or in building up the blood; that it would restore health or supply any minerals needed in sustaining health or that it contains minerals in quantities sufficient to be valuable in the treatment of acidity, acne, apoplexy, anemia, Bright's disease and some twenty-five other disorders.

Life Lite. — Ultra-Violet Products, Inc., Los Angeles; complaint issued Dec. 15, 1940; order issued June 16, 1942. Order prohibited these misrepresentations: That this device, which radiates ultraviolet rays, is a sun lamp or affords benefits to the skin or general health comparable to those given by natural sunlight; that it is a cure, remedy or adequate treatment for barber's itch, ringworm, athlete's foot, eczema, psoriasis or erysipelas; that it possesses any value in the treatment of asthma, hay fever, bronchitis, colds, sinus trouble or anemia; that it builds up resistance to disease, has any tonic effect on the blood or stimulates the skin tissues except by its irritating effect; that it quiets the nerves, improves the general tone of the body, induces sleep, relieves pain or builds new tissues, except as far as its use may result in the production of vitamin D. The order further prohibits the concern from circulating any advertisement which fails to reveal that excessive exposure to the lamp, either as to proximity or length of time, may injure the user; that the lamp should not be used in cases of pellagra, lupus erythematosus or certain types of eczema, or unless the eyes are protected by goggles. The order permitted, however, that it would be sufficient for the advertisements to state, "Caution: Use only as directed," provided that sufficient warning was given on the label.

Ward's Posture-Aid Health Belts, Diab Reducers and DuPont Velutex Perforated Reducers. — Montgomery Ward & Company, Chicago; complaint issued Jan. 20, 1941; order issued June 30, 1942. Order prohibited the concern from representing that wearing of these products would reduce excess flesh and accomplish other related results, whereas such use actually would not cause a reduction of local body tissue or effectively remove fat, although the garments would afford artificial support, lessen the prominence of pendulous abdomens and change the physical appearance by compressing that portion of the body about which they were placed. The order further directed the company to cease using the words "Health" or "Reducers" as part of the designation for such devices when sold in interstate commerce; to stop representing that the wearing of such devices will remove excess flesh or will mold the abdomen gently or correct figure faults in excess of compressing that part of the body about which the devices are placed and only to that extent improve the appearance of the wearer while the devices are in use. The company also was ordered to cease representing that the devices will correct pendulous abdomens or take two or three or any certain number of inches from the wearer's diaphragm and make it easy for him to reduce.

Vita Ray. — In August, 1940, the Federal Trade Commission issued a complaint against Sterling Products, 170 Varick St., New York, and the Vita-Ray Corporation of Lowell, Mass. Subsequently, in May, 1942, the Commission issued an order against these concerns, reporting that its findings were to the effect that the promoters' cosmetic cream has no beneficial or therapeutic effect because of the addition of vitamins A and D; that there is no scientific basis for the claim that there is any local, direct or selective action at the site of application or that there is any local or systemic effect whatever. The respondents were also ordered to cease disseminating advertisements which represent that their cosmetic creams and oils have any added beneficial value on the skin by reason of their vitamin content. — [Reprinted with permission, J. A. M. A. **120**:641 (Oct. 24;) 785 (Nov. 7) 1942.]

The Civilian Evacuation Program

The Office of Civilian Defense and the Office of Defense Health and Welfare Services have been working on a general program of evacuating civilians and maintaining them in reception areas in case of air raids or other enemy action. A joint committee from these offices has published Bulletin No. 1 and Evacuation Bulletin No. 2, which cover the policies and principles of the civilian evacuation program, the basic problem relating to planning for the voluntary evacuation of designated groups of civilians, the making of surveys to discover the suitability of communities for reception in relatively safe sections of the country, and arrangements for the supplementing services and facilities during removal and after relocation. Evacuation Bulletin No. 2 does not cover detailed plans for emergency shelter on the day of a disaster or for possible rehousing of parts of the population in areas surrounding large military objectives. The plans for emergency shelter will be covered in another bulletin.

The joint committee on evacuation comprises the director of the Office of Civilian Defense as chairman, a representative of the Office of Defense Health and Welfare Services as secretary, and representatives not only of these offices but also of the Children's Bureau, the Public Health Service, the Office of Education and the Social Security Board. The material developed by this committee is made available to appropriate state and local officials through the regional directors of the Office of Civilian Defense.

Chicago Beach Hotel to Become Hospital for Air Force

The Chicago Beach Hotel, on Hyde Park Boulevard, Chicago, has been taken over by the Army and is being remodeled for use as a hospital for the air forces technical training commands. The hospital will care for students in the new army air forces radio school, with headquarters in the former Stevens Hotel on Michigan Avenue, as well as those in other air forces schools in this area. Col. Joseph J. Mack, executive officer of the hospital, is reported to have said that all rooms in the former hotel will become rooms for patients containing two or three hospital beds, except those on the ground, mezzanine and third floors. The ground floor will become a receiving room for patients, the trunk room a medical supply room, the medical detachment personnel will have their mess hall in the former dining room and cocktail lounge at the south side of the hotel, and the large lounge off the main lobby will become a mess hall for patients.

Dr. Stephen Flatt 1872-1942

It is with regret that we record the death of Dr. Stephen Flatt of Independence, Kansas. Dr. Flatt was born in 1872 and graduated from the St. Louis College of Physicians and Surgeons in 1898, was licensed to practice medicine in Kansas in 1912, was a Fellow of the American Medical Association and a member of the American Congress of Physical Therapy for a number of years.

Dr. Mary Louise Lines 1859-1942

It is with regret that we announce the passing of Dr. Mary Louise Lines of Brooklyn, New York. Dr. Lines was born in 1859 and graduated from the University of Michigan Homeopathic Medical School at Ann Arbor, Michigan, in 1884; was licensed to practice in Michigan in 1884, was certified by the American Board of Ophthalmology and specialized in Ophthalmology, Otology, Laryngology and Rhinology. Dr. Lines was a member of the American Medical Association and of the American Congress of Physical Therapy. We extend our sympathy to her many friends.

BOOK REVIEWS

THE 1942 YEAR BOOK OF PHYSICAL THERAPY. Edited by *Richard Kovács*, M.D., Professor and Director of Physical Therapy, New York Polyclinic Medical School and Hospital, etc. Cloth. Pp. 416, with 126 illustrations. Price, $3.00. Chicago: The Year Book Publishers, Inc., 1942.

The extraordinary standard for detail erudition and timeliness maintained in this section of the Practical Medicine Year Book since its inception raises the difficult question whether it is more appropriate to pay homage to the sacrificing labors of its editor and publisher or limit all commendation to the meaty and practical nuggets that make up the contents of this book. For truly few works of its kind so thoroughly and inclusively provide such an extensive summary of the multisided contributions and special action of clinical physical therapy than is recorded in the pages of this year's volume. The topics include and range from the simple to the complex and from informal clinical experiences to formal laboratory observations. In other words, here as in past editions, an attempt is made to present in concise style the scope of contemporary physical medicine and hence should especially appeal to student and practitioner of this discipline. This year's book devotes particular space to the practical value of physical therapy as related to our war problems—rehabilitation service, chronicity in relation to fatigue syndromes, arthritis, paralysis and the like. Part II (Applied Physical Therapy) provides a rich discussion and review of the many special and miscellaneous conditions in which this form of therapy has proved itself an invaluable aid or a specific factor in the cure of a host of difficult clinical problems. Every specialist and not least every general practitioner, will here find many valuable suggestions and therapeutic inspirations which will make the reading and small expense in time and money one of the most profitable investments for himself and patient. To the Physical Therapist, this is a "must" book.

CLINICS. Edited by *George Morris Piersol*, M.D., Professor of Medicine, Graduate School of Medicine, University of Pennsylvania. Vol. I, No. I. Paper. Pp. 264. Price, $12.00 per year, bi-monthly. Philadelphia: J. B. Lippincott Company, 1942.

In June 1942, Dr. Piersol with the collaboration of 16 authorities in their field published the first number of a new volume—"Clinics." The editor states that the selection of material will be on the basis of its practical significance and that the institution or group or section of the country where such work is being done is only of secondary importance. The reports of work done will all be of value to the general practitioner. The editor believed that the progress in medical work should be reported over shorter intervals than the old style quarterly International Clinics. The result is the new Lippincott publication: Clinics—a bi-monthly. There will be in each number a symposium, a section for original contributions; a space for clinics and finally a review of recent progress.

In the first issue the editors, the collaborators and the contributors have lived up to the editor's ideals. There is an excellent symposium on burns, giving the local treatment, the plastic repair, the use of plasma, the physiologic and clinical basis of the treatment of shock and the treatment of this condition. The section on original contributions includes observations on the epidemic influenza in North Carolina; headache of otorhinologic origin and the evaluation of cardiac efficiency. There are seven short clinics in the next section. The final section gives a complete review of the recent progress in the responses of the peripheral vessels in man to various drugs. These clinics are timely and contain many practical and useful articles.

MANUAL OF DERMATOLOGY. MILITARY MEDICAL MANUALS. Issued under the Auspices of the Committee on Medicine of the Division of Medical Sciences of the National Research Council. By *Donald M. Pillsbury*, M.D.; *Marion B. Sulzberger*, M.D., and *Clarence S. Livingood*, M.D. Cloth. Pp. 421. Price $2.00. Philadelphia: W. B. Saunders Company, 1942.

This manual sets forth briefly and simply the management of the dermatoses encountered in the armed forces. Since the patients treated will be adult males emphasis has been placed on the common skin diseases affecting the persons of this age—sex group. However, the discussions on diagnosis and the direction for treatment will, it is hoped, be sufficient to enable the medical officer to deal satisfactorily with all but the most unusual or special dermatoses encountered in the very young, the very old or in women. No rarities, no obscure diseases, nor any untried methods of treatment are discussed. Fine points of definition, discussions of theories of treatment and the pathogenesis are curtailed to the essential minimum. The latest available figures show that in the Army skin diseases produced 9.80 per cent of all admissions to the sick list and in the Navy they produced 9.79 per cent of all admissions to the sick list. By and large, it has been found that the dermatologic problems of the Army and the Navy are almost identical. Some slight differences exist, such as the higher incidence of plant dermatitis in the Army or the fact that the sailor who presents an acute eruption usually has a sick bay available where medicated baths can be given, wet dressings applied; while the soldier who is with his regiment cannot as a rule be given medicated baths or wet compresses. Minor differences of this kind

have been met here by mentioning both the Army and Navy method of dealing with the specific problems. This manual can be highly recommended.

SURGICAL CLINICS OF NORTH AMERICA. August, 1942. Volume 22, Number 4. Pp. 298, illustrated. Issued serially, every other month. Per year (6 consecutive bimonthly numbers): Cloth $16.00; paper $12.00. These clinics are sold only by a year of six consecutive bimonthly numbers. Philadelphia: W. B. Saunders Company, 1942.

This number is devoted to a symposium on industrial surgery edited by Dr. Hart E. Fisher, Chief Surgeon and Medical Director, Chicago Rapid Transit Company. Dr. Hart Fisher writes on "The Surgeon's Contribution to the Reduction of Man Hours Lost Through Industrial Accidents"; Dr. Harry E. Mock, on "Management of Craniocerebral and Associated Injuries"; Dr. Thomas D. Allen, on "Industrial Ophthalmology"; Dr. Earle H. Thomas, on "Fractures of Jaws and Injuries of the Face, Mouth and Teeth," and Dr. Nelson J. Howard, on "Injuries of the Shoulder Girdle." Injuries to the chest, hernia in industry, etiology of inguinal hernia, fractures of long bones, injuries to knee joint, relation of the general physical condition to industrial accidents and the casual relationship, disability periods and schedule losses are clinics given by well known authorities. "Physical Therapy in Industrial Injuries," by Dr. John S. Coulter, will interest physical therapy physicians and technicians. "Treatment of Infected Wounds in Compound Fractures," by Dr. H. Winnett Orr; "Use and Abuse of Fluoroscopy in Industrial Surgery," by Dr. James T. Case, and "Burn Therapy," by Dr. Grover C. Penberthy and others, combines the experience of World War I and many years of civilian experience in industrial surgery. This volume should be in the library of every one interested in industrial surgery.

TIME AND THE PHYSICIAN. An Autobiography. By *Lewellys F. Barker*. Cloth Price, $3.50. Pp. 350 with 8 illustrations. New York: G. Putnam's Sons, 1942.

Dr. Barker starts his first chapter, which describes his Quaker childhood in Canada, by an excellent quotation "the best thing anyone can do, when occasion serves, is to tell what he himself knows; it may be of small value, but at the worst it is not second-hand." This distinguished physician tells the story of his infinitely varied and interesting life. In the next two chapters he describes his high school life and his apprenticeship to a pharmacist; how the pharmacist allowed him his freedom and even offered him a loan to go to medical school at Toronto; and his life as an interne in the Toronto General Hospital. After this he was a postgraduate student at Johns Hopkins under Dr. Osler. Later he served as an Associate in Anatomy and Resident Pathologist. Baker studied in Europe in 1895 and went to the Philippine Islands in 1899 to study tropical diseases; and in that time visited India to inspect the plague districts. It may surprise the many who know Dr. Barker to realize that he spent five years (1900 to 1905) in Chicago as Professor of Anatomy at the University of Chicago. While he was in Chicago Osler resigned at Johns Hopkins to accept the Regius Professorship of Medicine at the University of Oxford. Dr. Barker was soon afterward chosen to fill Dr. Osler's place at Johns Hopkins. Barker has interesting chapters on the "Head of Medicine" at Johns Hopkins and the "Resignation of the Headship of the Department of Medicine." In 1911 as Barker could not accept it on account of his financial responsibility Dr. Theodore Janeway of New York was appointed the first full time professor of medicine at Johns Hopkins.

The fascinating details and the many medical honors of his long and useful life are related in subsequent chapters. He has many illuminating things to say about the problems of the physician, about the ethics of private practice and the responsibility of the physician to his own family. "Time and the Physician" is a book that will appeal to medical men and to lay readers to whom the story of a medical career is perpetually fascinating.

ULTRAVIOLET LIGHT AND ITS APPLICATIONS. Including a Description of the Numerous Practical Applications Found for Ultraviolet Light and Fluorescence in the Industries, Sciences and Arts. By *H. C. Dake*, Editor, *The Mineralogist Magazine* and *Jack De Ment*, Associate Editor, *The Mineralogist Magazine*. Cloth. Pp. 209, 6 illustrations. Price, $3.25. Brooklyn, N. Y.: Chemical Publishing Co., Inc., 1942.

This is a timely and useful volume presenting the many practical applications of ultraviolet radiation and fluorescence in the industries, sciences and arts. Most of these uses have been developed during the past decade. The first two chapters deal with the closely related fields of ultraviolet applications in criminology and military uses and the subsequent chapters present applications in advertising, medical science, microscopy, chemistry, spectroscopy, petroleum and mining. The presentation is non-technical and practical and thus this book becomes a fitting culmination in the series of studies by the same authors, the two previous volumes being, "Fluorescent Light and Its Applications" and "Fluorescent Chemicals and Their Applications." There are many possibilities of further developments in this fertile field.

ANNUAL REVIEW OF PHYSIOLOGY. Volume IV. By *James Murray Luck*, Editor and *Victor E. Hall*, Associate Editor. Cloth. Price $5.00. Pp. 709. Stanford University, P.O., Calif.: Annual Reviews, Inc., 1942.

As usual any review of physiology is of interest to physical therapy physicians. The following serve as instances. Under the chapter on developmental physiology by Hamilton and Willier of Johns Hopkins the activation of calcium in the egg cortex was indicated when certain eggs were irradiated with light; in the development of form certain areas can be altered by ultraviolet irradiation; and in embryonic induction it is reported that moderate

ultraviolet irradiation of inductor material considerably reduces its potency. In the chapter on growth by George S. Avery, Jr., of Connecticut College, the effects of light on the external factors of growth are shown as well as the experimental studies in the field of photoperiodism. In the chapter on the physiology of the skin by Perry C. Baird, Jr., and Walter F. Lever of Massachusetts General Hospital, and Tom D. Spies of the University of Cincinnati, the photosensitivity of the skin is discussed at length. Under the physiology of reproduction by Hisaw and Astwood of Harvard University the influence of light on the physiology of reproduction is considered. The use of ultraviolet irradiation as a preventive measure against infection of the upper part of the respiratory tract is discussed in the chapter on applied physiology by Lt. Com. A. R. Behnke and Capt. C. S. Stephenson of the Navy. Every chapter in the review is by an authority in the field. This volume can be highly recommended to those interested in physiology.

MEDICAL PARASITOLOGY. By *James T. Culbertson,* Ph.D., Assistant Professor of Bacteriology, College of Physicians and Surgeons, Columbia University. Cloth. Twenty-one Plates, 16 Figures, 7 Tables. Pp. 209. Price, $4.25. New York: Columbia University Press, 1942.

The author reminds us that hitherto parasitology has been neglected in the curricula of our medical schools. Although many of the diseases caused by animal parasites are peculiar to the tropics, nevertheless, we see some of them in our own country and will doubtless see more and more of them on account of the wide distribution of our armed forces and because of rapid travel by air from distant lands.

The book is divided into the introduction, part one and part two. Part one is composed of six chapters on the general topics, infection, epidemiology, natural resistance and acquired immunity, diagnosis, specific therapy and prophylaxis. Chapter two contains an excellent classification of the animal parasites. The discussions of the individual parasites contained in part two consist of the geographical distribution, the morphology, the epidemiology, the pathogenicity, the diagnosis, the specific therapy and the prophylaxis. The presentation which is clear, concise and comprehensive, is greatly enhanced by plentiful plates and figures. This work can be highly recommended as a textbook for medical students and as a ready reference work for the busy practitioner.

CHEMISTRY AND PHYSIOLOGY OF THE VITAMINS. By *H. R. Rosenberg,* Sc. D. Cloth. Pp. 674. Price, $12.00. New York: Interscience Publishers, Inc., 1942.

This volume, a comprehensive treatment of the chemistry and physiology of all the vitamins is a welcome addition to the literature. Nutrition is one of the most discussed topics of the day. The full importance of vitamins to a nation during war is being recognized. Each vitamin is discussed as to nomenclature and survey, chemical constitution and synthesis, industrial methods of preparation, biogenesis, specificity, determination, standards, physiology, pathology and requirements. The volume is not only well written but the material is well arranged. In addition to a good index there is a valuable patent index relative to both general and specific vitamins. It contains a wealth of references. Anyone desiring an authoratitive reference book giving the latest and most complete information on the vitamins will find this volume of unusual value. It is highly recommended.

RED CROSS HOME NURSING. By *Lona L. Trott,* R.N., B.S. Paper. Price, 60 cents. Pp. 431. Philadelphia: The Blakiston Company, 1942.

In accordance with its aim to train one member of every family group in the United States in home nursing, the American Red Cross has issued as the textbook for its classes in home nursing, the fifth edition of the book which appeared in 1913 under the title "Elementary Hygiene and Care of the Sick," by Jane A. Delano and Isabel McIsaac. It is excellent as a textbook, containing a wealth of useful information on such subjects as the building of mental and emotional health, the selection of food, antepartum care and the physiology of birth, the care of infants and children and the care of different types of patients in the home. It is a practical book, for it deals with details as well as with basic principles. Capably written and illustrated, it should do much toward making the Red Cross program in home nursing a success.

BIOLOGICAL SYMPOSIUM: A SERIES OF VOLUMES DEVOTED TO CURRENT SYMPOSIA IN THE FIELD OF BIOLOGY. Edited by *Jaques Cattell.* Volume VIII: VISUAL MECHANISMS. Edited by *Heinrich Klüver,* Professor of Experimental Psychology, the University of Chicago, Chicago. Cloth. Price, $3.25. Pp. 322, with illustrations. Lancaster, Pa.: Jaques Cattell Press, 1942.

This volume represents a collection of papers, each written by a scientific investigator of the highest rank, presented at a Symposium on Visual Mechanisms in celebration of the Fiftieth Anniversary of the University of Chicago in 1941. The problems of vision from the physical, biochemical, physiologic, anatomical, histologic and psychologic viewpoint are discussed. Hecht discusses "Energy Relations in Vision"; Krause, "The Photochemistry of Visual Purple"; Wald, "Visual Systems and the Vitamins"; Gellhorn, "Anoxia in Relation to the Visual System"; Bartley, "Visual Sensation and Its Dependence on the Neuro-Physiology of the Optic Pathway"; Case, "Alpha Waves in Relation to Structures Involved in Vision"; Marshall and Talbot, "Recent Evidence for Neural Mechanism in Vision Leading to a General Theory of Sensory Acuity"; Von Bonin, Garol, and McCulloch, "The Functional Organization of the Occipital Lobe"; Polyak, "Anatomy of the Retina"; Walls, "The Visual

Cells and Their History"; Klüver, "Functional Significance of the Geniculo-Striate System"; Lashley, "The Problem of Cerebral Organization in Vision."

The appeal of this highly valuable scientific work will be to the ophthalmologist, but it should also find a place in the library of the person who wishes to keep in touch with the advance of scientific medicine. The importance of vitamin therapy in ocular diseases is just beginning to be appreciated. There is an excellent bibliography at the end of each chapter. The volume is well illustrated. Undoubtedly this volume will enjoy a well deserved place in the library of the research worker.

FRACTURES. By *Paul B. Magnuson*, M.D., F. A. C. S., Associate Professor of Surgery, Northwestern University Medical School, Attending Surgeon, Passavant Memorial Hospital and Wesley Memorial Hospital, Chicago. Fourth Edition Revised. Cloth. Price, $5.50. Pp. 511 with 317 illustrations. Philadelphia, Montreal and London: J. B. Lippincott Company, 1942.

All the methods described in this book have been thoroughly tried in practice which can be said of few if any books on fractures. Consequently few, if any can say what Magnuson says of his methods "And with thought and attention to detail they will work in the hands of any man, because they are simple and because they all take into consideration the anatomy and physiology of the parts under treatment, with the mechanical features simplified so that they may be applied without any great amount of special equipment." This book meets the needs of the physician who first sees the fracture. In the monograph the methods of treatment are simplified and the problem of fractures are approached from the standpoint of anatomy and physiology. The operative treatment of fractures is not included except to indicate certain operative procedures which may be used by those who are skilled in this branch of surgery. Some of these operative procedures are not well known, and, therefore they are mentioned as a matter of information in order that the man who sees the fracture first may make up his mind concerning the prognosis of that particular case and form an opinion about the advisability of early operation. The section on the indications and technic of physical therapy is contributed by Dr. John S. Coulter, Associate Professor and Chairman of the Department of Physical Therapy at Northwestern University Medical School.

The popularity of this book is shown by the fact that this is the fourth edition in nine years. The additions that are made have to do for the most part with the first aid, transportation and early treatment of compound fractures. The suggestions which are brief and concise that are incorporated are not the author's alone but represent the consensus of opinion of the Subcommittee on Orthopedic Surgery of the National Research Council. The choice of method in civil practice is governed by circumstances and by the judgment of the surgeon, but for battle and roadside conditions and in the average civilian hospital, it is the opinion of the majority of men in this field that the procedures as outlined are sound and should be carried out. In this edition as in the past each fracture is considered separately. The treatment is based on a knowledge of the physiology and anatomy of the parts involved, plus a consideration of the fact that it is an injury to the body as a whole, not just to one part of the body. To this end, the treatment of wounds, especially of wounds in compound fractures, *débridement* of wounds, the use of sulfotherapy and the treatment of shock are also included. The book should be read by every general practitioner, by every surgeon and by every physician entering the armed forces of the United States.

PHYSICAL THERAPY ABSTRACTS

The Kenny Treatment of Infantile Paralysis During the Acute Stage. Philip Lewin.

Illinois M. J. **81**:281 (April) 1942.

The Kenny treatment is one of the most outstanding advances in orthopedic surgery since the time of Hugh Owen Thomas and Sir Robert Jones. It is evident to anyone who has carefully and impartially observed Miss Kenny or her trained personnel in the treatment of patients with infantile paralysis, that continuous rigid splinting is not only "on its way out," it is "out." It is evident that if Miss Kenny is correct there is probably no such entity as paralysis of an individual muscle. If one accepts Miss Kenny's theory of intercostal muscle spasm, the respirator may be harmful.

After nearly two years follow-up study of the 54 cases treated in the Minnesota hospitals by Miss Kenny or by her trained assistants, the medical observers are emphatic in their statements that they have observed complete recovery of the muscles of the trunk, abdomen, back and neck. They have not seen the residual deformities so frequently observed in a definite proportion of cases treated by other measures.

In a group of patients treated at another hospital in the Twin Cities, which was intended to form the basis far a controlled study, it was impossible to maintain a truly controlled study because the parents of the children having infantile paralysis refused to permit withholding the Kenny treatment. Results in this series, however, were definitely better than those observed under previously accepted treatment but were not as good as those treated by the Kenny method at the Minneapolis General Hospital.

Miss Kenny has taught the medical profession that there is a primary physical change in the affected muscles as well as in the components of the central nervous system. She has jarred the medical and allied professions out of their complacency into an immediate offensive attack on the local condition which she has so thoroughly proved exists.

In closing let me say that the Kenny treatment is evidently the last word in the management of the acute stage of infantile paralysis. As new discoveries are made by clinical laboratory and research workers, the exact place for the Kenny treatment will be determined automatically.

Discussion On Rehabilitation After Injuries to the Central Nervous System. Geoffrey Jefferson.

Proc. Roy. Soc. Med. **35**:295 (Feb.) 1942.

Rehabilitation may be defined as: "The planned attempt under skilled direction by the use of all available measures to restore or improve health, usefulness and happiness of those who have suffered an injury, or are recovering from a disease. Its further object is to return them to the service of the community in the shortest time." These measures should be regarded as an essential part of treatment and should be commenced, in a graded way, as soon as the patient's condition allows. Thus, occupation in bed and in the ward is as important as occupation elsewhere for the ambulant patient. In this way the boredom, laziness and loss of adaptability, so often acquired during a prolonged stay in hospital, will be prevented. From the first the patient must be made to realize that he is an active collaborator in his own treatment and that he must accept some responsibility in his progress towards a successful result.

The methods to be employed in such treatment should include: (1) diversional and also constructive occupations of sufficient variety and varying degrees of difficulty for those still confined to bed, as well as for those who are ambulant; (2) hospital maintenance work in the ward and outside; (3) physical therapy, remedial exercises, massage, physical training and, (4) intellectual and recreational pursuits.

Rehabilitation may be divided into stages corresponding with the progress of the patient from his original admission to hospital, through to his discharge and back to his home and employment.

Stage one covers the period during which the patient is in hospital—confined to bed or ambulant and is undergoing the early treatment appropriate to the local repair of his injury. The retraining of speech by a speech therapist will be required in most cases of dysphasia. This treatment should be started when convalescence is well established, about the third or fourth week.

Physical therapy will be required (it has of course already been provided in all Brain Injury Centers). Physical therapy should not dominate the general rehabilitation scheme which is a cooperative affair in which all branches play a helpful part.

The patient convalescent from head injuries is something different. He should be urged to use his mind and to take an active part in his treatment, which will, without his interested cooperation, fail.

The second stage occurs some six weeks after the injury. Judged by experience from neurosurgical operations, when variable degrees of considered and carefully inflicted damage is done to the brain, it is known that in some six to eight weeks the effects of the operation have passed.

The methods of treatment to be employed will be, in the main, the same as in stage 1, but with additions such as: (1) gymnastics and physical training; (2) continuation of physical therapy when necessary; (3) basket making, leather and metal work, the patient being allowed to keep the

finished article on paying the cost of materials; (4) speech training for those with dysphasias; (5) work in the garden; (6) work in the carpenter's and engineer's shops; (7) organized games—cricket, football, netball, baseball, rounders and open-air games; (8) walks outside the hospital grounds; (9) visits to the town, shops and cinema, but usually with the purpose of finding out how the patient reacts to the jostle of people and the noise of traffic, to navigating himself as an entity amongst his fellow men.

Physical therapy will be applied when it is needed. The recreational side, such as attendance at dances, will be more in evidence.

An essential of rehabilitation is that it should be planned to a time-table each day. Patients should continue with a pastime of constructive work only for definite periods; he should be stopped while he still wishes to go on. In that way interest is maintained.

The Early Treatment of Poliomyelitis. With an Evaluation of the Sister Kenny Treatment. Mary M. I. Daly; Jerome Greenbaum; Edward T. Reilly; Alvah M. Weiss and Philip M. Stimson.

J. A. M. A. **118**:1433 (April 25) 1942.

It is still too early to make any statement as to the eventual recovery in these 26 paralytic cases. However, the following observations have been summarized:

1. Spastic muscles were found in all patients. This spasm was noted in otherwise uninvolved muscles as well as in weak and paralyzed muscles. It was relieved by hot packs.

2. In general, the return of unrestricted passive motion took place weeks and months earlier than when orthodox treatment with splinting was used.

3. Complete comfort, at rest, was enjoyed by all patients after one to three days of hot packs. Older patients, especially those who had been in splints, remarked on the comforting effect. Sedation was practically never necessary in this group.

4. In performing passive exercises with a completely flaccid muscle, the examiner would feel tone in that muscle long before the patient became aware of it, and frequently several weeks before the patient had any voluntary control over the muscle.

5. During the period of recovery the patient frequently illustrated what Sister Kenny calls "mental alienation." Although able at the end of one day's exercises to perform a coordination action with a given muscle or muscle group, the patient would completely forget on the following day how that action was performed. However, after several passive motions the patient would again remember the action.

6. In 4 patients under 3 years of age, no attempt at substitution was noted. When muscle function returned in these patients, coordinated movements were seen.

7. While six to nine packs in twenty-four hours of the type described were adequate for relaxation, three to four were not, as was evidenced when there was a temporary diminution in the nursing personnel. During this time an increase in the amount of spasticity was noted in practically every patient.

8. The tendency toward atrophy and deformity was minimal in this group. In fact, it was rarely seen in patients treated from the onset of the disease. The general condition of the skin and muscles was excellent. No burns occurred.

The Kenny Treatment of Infantile Paralysis in the Acute Stage. James E. Dyson.

J. Iowa M. Soc. **32**:297 (July) 1942.

The State University Hospital in Iowa City and the Iowa Lutheran Hospital in Des Moines will be equipped to carry out this treatment. The Lutheran Hospital is equipping a separate quarantine building where the patient with infantile paralysis in the acute stage may come during the infectious period. Miss Louise Agenes, a pediatric nurse, who has been with Miss Kenny for the past six months will direct the treatment. The University of Minnesota continuation center is giving short courses to physicians, nurses and physiotherapists.

The author believes Miss Kenny has given us a new concept of the treatment of the symptoms of poliomyelitis in the acute stage. It relieves pain and muscle spasm. It maintains muscle function, joint function and tends to prevent deformities. It maintains and even re-establishes neuromuscular pathways. The author believes it will considerably lessen the percentage of permanent paralysis and deformity.

Electroshock Treatment in the Psychoses. L. H. Smith; J. Hughes; D. W. Hastings, and B. J. Alpers.

Am. J. Psychiat. **98**:559 (Jan.) 1942.

The most common complications are fracture and memory defects. In 156 patients treated we have seen the following fractures: (a) five cases of compression fracture of a thoracic vertebra (usually fourth to eighth). Two of these were asymptomatic and were discovered by routine roentgenograms; (b) two cases of fractured humerus, and (c) one case of linear fracture of the scapula. These 8 mishaps give about a 5 per cent rate of fractures. The metrazol fracture rate was about 22 per cent.

Almost all patients experience memory defect sometime during treatment and consider it an unpleasant symptom.

After one year's experience the author has come to the following conclusions: (1) Electroshock is better than metrazol because the convulsion tends to be less severe and the fracture rate is 5 per cent (against a fracture rate of 22 per cent with metrazol). (2) Electroshock is also preferable because the patient has no recollection of, and consequently is not terrified by; the treatment. (3) It is more easily given to a noncooperative patient in whom a venipuncture would be difficult. (4) Electroshock is simple in application and inexpensive for the patient. (5) The ill effects of treatment in reference to cardiac stress and strain have been found less severe than similar effects with metrazol and insulin therapy.

perhaps because of the lack of side effects from drugs. (6) Our series of cases show favorable results in involutional melancholia and in manic-depressive psychoses. (7) In spite of the favorable clinical results of electroshock, we cannot recommend a routine or indiscriminate use of the treatment.

Action of Short Waves on Flow of Bile. A. Leskovar.

Ztschr. f. d. ges. exper. Med. **108**:523 (Dec. 28) 1940.

Leskovar showed that with the application of short waves to the gallbladder two effects can be expected: (1) action on the hepatic parenchyma; (2) action on the smooth musculature of the extra-hepatic biliary system. The author is concerned chiefly with the effect on the hepatic parenchyma. Experiments on 6 rabbits and 5 dogs demonstrated that a mild choleresis is induced when short waves (6 meters) are applied for from fifteen to thirty minutes to the upper part of the abdomen. The choleretic action of the short waves is not as great as that of a mineral water with a considerable magnesium content. Short waves do not influence the biliary secretion elicited by the food stimulus. Determination of the dry residue of the bile indicated that short wave treatment does not produce contractions of the gallbladder that lead to the expulsion of bladder bile. Examination of the liver bile in 2 dogs disclosed that short wave treatment increased its water content in 1 case and decreased it in the other. — (Abst. J. A. M. A. **119**:848 [July 4] 1942.)

Uses and Abuses of Splints and Other Instruments in the Treatment of Nerve Lesions. T. P. McMurray.

Brit. J. Phys. Med. **5**:20 (Feb.) 1942.

The question has been asked: Does not prolonged fixation of a joint by itself produce rigidity? It may be taken as a basic principle of treatment that a normal joint with normal periarticular tissues can be immobilized in a position of rest almost indefinitely without producing either permanent or troublesome rigidity at the joint.

The principles of splinting to be used in the treatment of paralysis of any muscle, or group of muscles, can be summed up by saying that the essential object is the continuous relaxation of the paralyzed muscle tissue for a period sufficiently long to aid the restoration of function, assuming always that recovery takes place in the nerve supplying the paralyzed muscle.

Splintage is of value in almost all motor nerve injuries, but it has its greatest usefulness in nerve lesions which cause paralysis of extensor groups of muscles, i.e., in the groups which normally act against gravity.

In his conclusion the author states that splintage of a paralyzed muscle or of a group of muscles is used solely to prevent the overstretching of the inactive muscle fibres during the period of the loss of nerve stimulus. By splintage the paralyzed muscle fibres are relaxed and kept in the most advantageous condition for a restoration of function if, and when, the function in the motor nerve is restored. Splintage improperly used may be the cause of crippling rigidity owing to the fixation of a joint at any angle other than that of rest. Some form of support from splintage may be required for many months and should be persevered with so long as the electrical reactions indicate an improving nerve function.

Chronic Hypertrophic Osteoarthritis in the Cervical Spine With Radiculitis. A Report of 40 Cases With a Review of the Literature Together With Some Notes on Effective Methods of Treatment—Part III. Le Moyne Copeland Kelly.

New York State J. Med. **42**:336 (Feb. 15) 1942.

Heat in all forms is recommended. Wagenthals and Neviaser applied hyperextension to the spine along with applications of heat and secured gratifying results. Hanflig used the Sayre head traction apparatus and proceeded to maintain the hyperextension in 5 of his cases by fitting a Thomas collar (all of the patients complained that their root pains began to return as soon as they were lowered to a sitting position). Some authors applied traction only in those cases when the symptoms tended to persist following roentgen ray treatment or when there was some particular mechanical indication for it.

Deep roentgen therapy gives the results in patients not relieved by physical therapeutic measures.

The incidence of cases of chronic hypertrophic osteoarthritis of the spine associated with symptoms is apparently increasing in private and in clinic practice. Thinning of the intervertebral disk can cause a unilateral or bilateral narrowing of the corresponding intervertebral foramina with resulting compression of nerve roots. There is a predilection for the pathologic change to center in the lower cervical vertebrae, since these are more subject to trauma and the foramina in this are smaller in proportion to the size of the emerging nerve roots.

The outstanding characteristic of the syndrome is aggravation of all symptoms by any movement of the spine (particularly by hyperextension) and by coughing, sneezing, or straining. Most root pains ("peripheral neuritis") associated with aching and soreness of the muscles of the shoulder and aggravated by motion of the neck are due to an osteoarthritis of the cervical vertebrae. Every case presenting complaints of pain or limitation of motion in one or both shoulders warrants a thorough study of the cervical spine, particularly if enough local pathologic change has been found in the shoulder to account for the symptoms but where no response has been obtained to specific treatment to that shoulder. No direct relation has been found with regard to age,

sex, race, body weight, type, or the general state of the patient's health. Radiculitis can involve any group of nerve fibers contained in any nerve root-motor, sensory, or sympathetic, and the symptoms, unilateral or bilateral, may reflect evidence of irritation or loss of function, either partial or complete.

Chronic osteoarthritis of the cervical spine may at times have a bizarre onset and so should be kept in mind constantly as a possibility in the differential diagnosis of pains in the head, neck, chest and upper extremities. Chronic arthritis of the cervical spine is a frequent cause of a characteristic, occipital, early-morning headache. This condition can be diagnosed in the absence of definite roentgenographic x-ray findings and the proper therapy instituted. Arthritis in the cervical spine can constitute an "irritation focus" for neuralgias of the cranial nerves and thereby explain such unusual symptoms as unilateral sore throat and ear ache not associated with local pathologic change.

Osteoarthritis of the cervical spine can cause precordial pain which, at first, may be indistinguishable from that due to organic heart disease, but a careful history and physical examination, together with electrocardiographic and x-ray studies, will serve to differentiate a radicular pain from that of visceral origin. In the differential diagnosis of pain in the neck, shoulder, or upper extremity, great care must be exercised and a wide variety of conditions must be considered. Hypertrophic changes in the cervical spine may be extensive and present for a considerable period of time without any roentgenographic evidence whatsoever of their presence.

Hazards of Fire and Explosion of Anesthetic Agents. III. In the Presence of Diathermy. Barnett A. Greene.

Surg., Gynec. & Obst. 74:895 (April) 1942.

Greene records 20 cases of fires and explosions ignited by diathermy apparatus. Three cases involving ether-air caused no injury; 8 cases of ether mixed with high concentrations of a source of oxygen (nitrous oxide or/and oxygen) resulted in the death of 2 patients, the serious injury of a third patient and 3 bystanders. One case of nitrous oxide-oxygen containing an unknown combustible seriously injured the patient. Two cases of ethylene-oxygen caused the death of 1 patient and in another the rupture of the urinary bladder with recovery following repair. Two cases of cyclopropane-oxygen occurred, with the death of 1 patient. There were 3 cases of surgical field fires: alcohol ignited in 2 with the death of 1 patient, and ether ignited in 1 instance with death of the patient.

The igniting spark appeared at the active electrode, where the threat is exactly identical with that presented by the actual cautery tip, in 14 cases. The detailed consideration of this type of obvious hazard would be only a repetition of our discussion of the cautery hazard, to which the reader is referred.

In the remaining cases, the igniting spark occurred in unexpected and unpredictable places in or near the respiratory path of the combustible anesthetics although both the inactive and active electrodes were deliberately and probably effectively kept out of contact with the gases. In these cases (definitely in 4 cases, and probably in 2 cases) the spark was of the type which is less obvious and more difficult of prevention, namely, the "diffuse sparking" which has been described in paragraph 5 of the electrical data presented in the early part of this paper.

The author considers in detail the electrical basis of all sparking or arcing during the use of high frequency apparatus. The prevention of all sparks is impossible. The localization of the hazard to one restricted zone, as is possible with the actual cautery, is practically impossible. No matter how far from the mask the electrodes are placed, there is serious danger of spark ignition of a combustible inhalation anesthetic mixture. In view of the relatively narrow field of use of surgical diathermy and because of the practical impossibility of spark prevention during diathermy, we have reached the conclusion that combustible anesthesia is contraindicated by the surgical need for diathermy in any part of the head, neck, body, and extremities.

Greene directs attention to the other hazards of surgical diathermy in the operating room, namely, surgical field fires, fulguration-produced explosions of hydrogen in the urinary bladder and electric shock and sparking resulting from short-circuits in defective apparatus.

Anesthetic fires and explosions ignited by diathermy, like those due to x-ray apparatus, are completely preventable only by the use of noncombustible anesthetic methods. Failure to use such methods in the presence of diathermy is an admission of inability to maintain the standards of safe anesthesia which have long been advocated by many authorities, which are here demonstrated as necessary and which are now practiced in the better departments of anesthesia and surgery.

The Management of Genitourinary Tuberbulosis. Arthur J. Greenberger, and Monroe E. Greenberger.

Dis. Chest 8:17 (Jan.) 1942.

Medical treatment will not cure genitourinary tuberculosis except in rare cases. The response of experimental tuberculosis to sulfanilamide derivatives has been reported, but is uncorroborated. The authors have noted no definite value in the use of tuberculin as yet nor have they had any favorable results with "tuberculosis diets," preferring a high caloric, high vitamin diet. For palliation of bladder symptoms, "shot-gun" mixtures of methylene blue, santal oil, gomenol and antispasmodics have proved more efficacious than most local anesthetic preparations. Secondary infections of tuberculous sinuses and cystitis occur and several cases have healed during courses of oral neoprontosil.

Quartz light therapy, general and local (intra-

vesical) has shown no appreciable results, but the authors continue its use in order to determine its value over a longer period of time.

The value of an adequate period of sanatorium care cannot be overemphasized. With improved nutrition, enforced rest and good hygiene, healing is promoted.

New Regulations Respecting Radio Interference by Electrical Equipment Now in Force.

Canadian Hospital **19**:20 (Feb.) 1942.

Interference from spark-gap electromedical apparatus, including diathermy apparatus, mechanical rectifiers for x-ray installations and violet-ray equipment has been under control since January 1, 1942.

The department came to the conclusion after prolonged observation that filters alone would seldom suppress interference; complete shielding of the room together with a suitable surge trap in the supply lines has been found necessary.

For the present, the regulations in Canada will not apply to installations for short wave therapy unless they seriously interfere with some vital radio communication. It is not unlikely, however, that they will ultimately be extended to include this equipment as well. It has been suggested that specially designed apparatus of this type might be permitted to operate in a restricted frequency band, thereby obviating the necessity of shielding, but the indications are that such special equipment will not be available for several years, if at all. It has been pointed out too, that, should the development of a suitable machine prove to be technically feasible, its cost is likely to be considerably above the present average—the difference possibly being in excess of the outlay for shielding a moderately sized room.

Control of Cross Infections of the Respiratory Tract. In a Nursery for Young Infants: A Preliminary Report. L. W. Sauer; L. D. Minsk and I. Rosenstern.

J. A. M. A. **118**:1271 (April 11) 1942.

During the two years the principle of air conditioning alone, as used in the control unit, did not prevent the spread of infections of the respiratory tract, whereas the addition of germicidal light barriers or mechanical barriers was efficient. Which of the two principles is the one of choice cannot yet be decided. Each has its advantages and disadvantages, several of which may be mentioned. Germicidal light barriers require protection of nurses and infants to prevent local effects on the skin and the conjunctivas. Investigations on any systemic effects have not yet been noted. The installation cost of the light is low, but the maintenance cost is high, regular lamp replacements being required. The mechanical barriers have been found somewhat inconvenient by the nurses, because the partitions must be raised and lowered each time an infant is attended. The infant cannot be observed readily. After a few weeks a certain lack of stimulation of the infant is occasionally apparent. On the other hand, the infant is protected against noise, so that the average daily sleeping time is about two hours longer than in the other units. The installation of mechanical barriers is expensive, but the maintenance cost is low. Whether light barriers or mechanical barriers are equally efficient without air conditioning is now under investigation.

Treatment of Rheumatoid Arthritis. C. J. Smyth and R. H. Freyberg.

Am. J. Med. Sci. **203**:580 (April) 1942.

Smyth and Freyberg treated 28 patients who had rheumatoid arthritis with different vasodilating drugs administered by carefully controlled iontophoresis; 79 per cent were partially relieved of their articular symptoms during and for a short time after the treatment. However, few patients had significant objective evidence of improvement attributable to iontophoresis. The results from vasodilating drugs administered by iontophoresis when compared with those following other local measures of physical therapy held no advantage. Iontophoresis is a reliable way of producing localized temporary increase in circulation, but it appears to have no important advantage over the less expensive and more accessible commonly employed methods of physical therapy. — (Abst. J. A. M. A. **119**:832 [July 4] 1942.)

The Use of Quick Freezing Methods in Gynecologic Practice—A Preliminary Report. Franklin E. Hall.

Am. J. Obst. & Gynec. **43**:105 (Jan.) 1942.

A new apparatus for quick freezing, the basic operating principle of which is the same as that of the electric refrigerator, is described. The applicators are especially designed for gynecologic therapy and the apparatus is equipped with a defrosting device, which greatly simplifies their removal from frozen tissue.

Excellent therapeutic results were obtained with this instrument in 60 cases of chronic endocervicitis, cervical erosions and cervical polyps.

Antisuppurating Effect of Red Rays. J. Erdely.

Rev. méd., Mexico **4**:723 (Nov. 15) 1941.

Erdely protected the area of smallpox vaccination in infants and children with a shield of two layers of red transparent material. The inner layer is loosely attached to the external one, which has some perforations for ventilation. Rays of natural light pass through the perforations and are filtered through the inner layer of red material allowing only red rays to pass. This shield prevents inflammation, fever and suppuration. Vaccination results in the formation of a serous vesicle. General reactions do not take place. When the shield is applied after suppuration has

formed the local and general reactions are diminished but are not prevented. The author believes that the inflammatory reactions of vaccination and suppuration are due to hypersensitivity of the skin to ultraviolet rays, whereas red rays have the effect of preventing suppuration. The immunizing effect of vaccination without suppuration is the same as that of vaccination with pustules. — (Abst. J. A. M. A. **119**:913 [July 11] 1942.)

The Role of Spas in Medical Preparedness. A Survey of the Accommodations Available at the Six Spas in New York State. Walter S. McClellan.

New York State J. Med. **42**:786 (April 15) 1942.

The presence of a healing water alone does not make a spa. Only when facilities are provided for its proper application and where physicians have made a study of the water to see that it is utilized in a regulated program can we say that a spa exists. At Glen Springs all patients are strictly under the care of a physician who outlines the program. At Clifton Springs an able staff of physicians is available to care for the patients. At Saratoga Springs the State in its development of the spa has provided for medical direction of the work, as well as for the initiation of a program of study and investigation. In addition to full-time administrative medical direction, the physicians in practice constitute the voluntary medical staff of the spa and assist in the care of the welfare patients. Both Sharon Springs and Richfield Springs have medical directors who, in addition to their regular private practice, advise the management in problems of medical administration.

Treatment of Arthritic Joints. Robert J. Joplin, and George J. Baer.

J. A. M. A. **118**:937 (March 21) 1942.

Rest, unquestionably, is the sheet anchor in the orthopedic management of arthritic joints. Comfortable support to the affected part should be provided in a neutral position or in a position for optimum use should the joint eventually become limited in motion or ankylosed. Active or guided motion (without injury) must be employed daily in an effort to retain as much motion as possible: first, by preventing the formation of adhesions within the joint; second, by preventing contractures of periaticular structures, and third, by providing a stimulus to the articular cartilages.

During the stage of acute activity, hot fomentations applied to the shoulders greatly relieve pain and muscle spasm and permit freer motion. Shoulder pulleys or screw eyes fastened to ends of a board, attached to the head of the bed, constitute a useful and simple device to assist active motion in the acute stages. Ordinary awning pulleys or screw eyes and awning rope may be obtained from the local stores.

In both the acute and chronic stages of the disease, dipping the hand in paraffin wax melted in a double boiler or pail is an effective means of applying heat for the relief of pain and muscle spasm.

After the use of heat, the preservation of motion may be maintained by daily voluntary exercises: i. e., by flexing the fingers well into the palms of the hands and also bringing them into complete extension. A good finger and hand exercise results from simply squeezing a rubber ball or a rubber sponge several times daily. Also, when recovery is sufficiently advanced, the use of occupational therapy, such as needle work, cord weaving, putty molding or wood carving, will greatly increase motion and promote dexterity.

In the acute stage of rheumatoid arthritis of the knee, flexion deformity may be prevented and pain lessened by the use of a posterior splint worn almost constantly while the patient is in bed.

Flexion deformities may be corrected by the application of solid plaster leg casts applied in the position of maximum correction and kept on for forty-eight hours. These should then be bivalved and removed, and the joints moved through as full a range of motion as possible.

After correction has been attained for a bedridden patient and weight bearing is ready to be started, the knee joint must be carefully protected and supported because of the weakness of the quadriceps muscles and other periarticular structures. Daily use of elastic overhead traction, "knee-push" apparatus or heat and massage to tone up weakened and atrophied muscles constitute further aids in rehabilitation. A step further in this direction would be the use of occupational therapeutic devices, such as the treadles on looms and the pedals on jig saws.

The Management of Acute Nasal Sinusitis and Its Complications. C. Gill-Carey.

Practitioner **148**:884 (Feb.) 1942.

The vitamin C intake should be kept at a high level, 400 to 500 milligrammes of ascorbic acid daily.

Common sense and an understanding of the action of the sulphonamide group of drugs, will enable full use to be made of this valuable aid. As Whitby (1941) pointed out, these drugs do not act in the presence of pus and they have little effect on bone infections.

Heat is a useful addition to other forms of treatment and may be applied simply by a hot-water bottle or electric light bath. Short wave diathermy is the most efficient means of applying heat and in many cases, shortens the duration of the attack. Caution in ordering this form of treatment should be observed, however, as in the presence of obstructed drainage serious exacerbations may result from its use. Local treatment must be adapted to the pathologic conditions present and to the particular sinus or sinuses involved.